JUNE, 1955

American Engineer

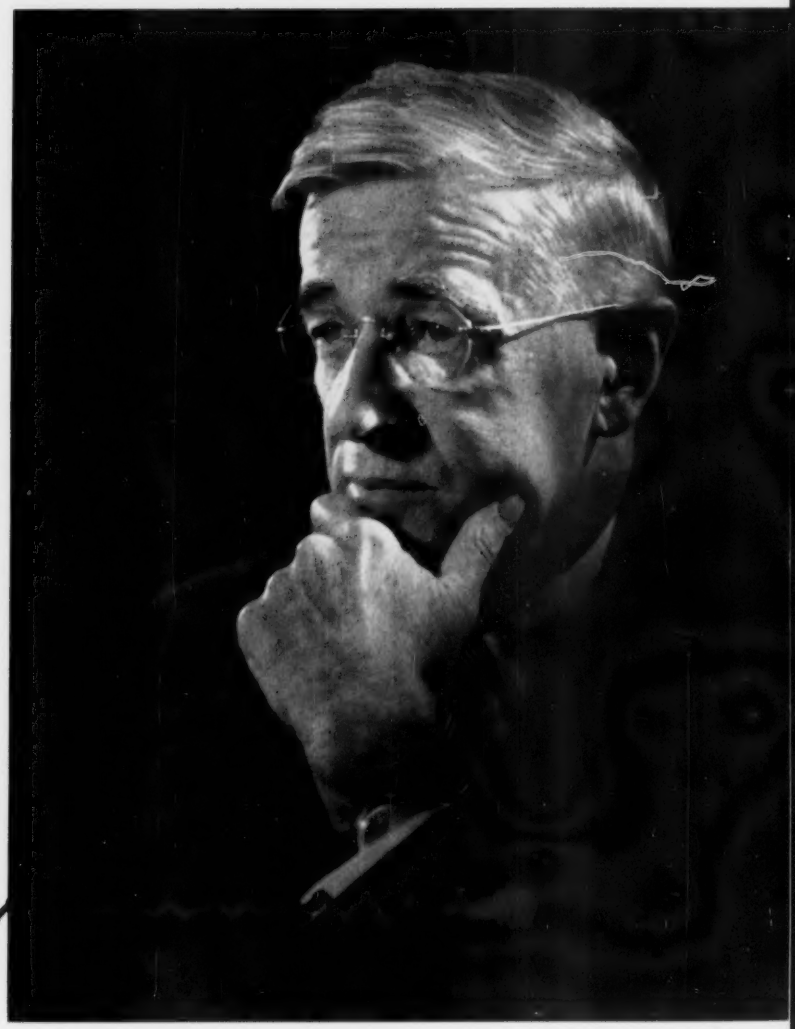
IN THIS ISSUE . . .

An Exclusive Interview with

VANNEVAR BUSH

President, The Carnegie Institution of Washington

The Famed Engineer and Scientist, and World War II Weapons Development Leader, Answers Questions about Research, Science and Culture, Technological Education, the Teacher Shortage, and the Engineer "Shortage."



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The Influence of Einstein ● How Dana Trains Jr. Executives ●
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American Engineer

JUNE

1955

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Men love to wonder and that is the seed of our science.
—Ralph Waldo Emerson

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• SPECIAL ARTICLES

An Interview with Vannevar Bush 9
The AE staff talks with the famous engineer about such subjects as research, education, the "shortage," and security.

The Influence of Einstein 15

The Engineer and His Government 16
By Frank G. Clement, Governor of Tennessee. This popular young official writes about morals, politics, and engineers.

Engineers Strike at Minneapolis-Honeywell 18

1903-1955: My Professional Journey 21
By Andrey A. Potter, P. E.

How Dana Trains Junior Executives 22
By Ren McPherson

A+ for Achievement—Second of a Series 26

• REGULAR FEATURES

Letters 4

Professional News Briefs 6

From Washington 19

Professional Postscripts 27

Book Looks 29

NSPE Believes—Surveys: How We Use Them 31

With Our Members 32

New Processes 28

Professional Directory 34, 35, 36, 37

Classified 38

Strictly Business 39

New Literature 41 Advertisers' Index 41

What's New—New Products of Interest 42

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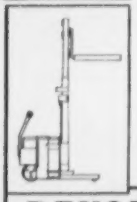

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Letters to the Editor

The "Week's" Purpose . . .

Dear Editor:

I have read the reports on National Engineers' Week, and it is obviously our most successful promotion to date. In this I rejoice, having worked on our local Engineers' Week Committee for four years now.

However, I feel a lack in the promotional efforts as they are reported.

Are we guilty of taking too narrow a view of the purpose of National Engineers' Week? What is our nationally avowed purpose?

As chairman of this year's committee in Fort Wayne, which represented the combined efforts of ten local engineering societies having a membership greater than our own state society, I was faced with the need for justifying to a number of skeptics the reason for the hullabaloo, as well as for setting goal posts for our local program.

I would like to give my version, as I presented it to our 300 banquet guests on February 24th:

"Why do we have an Engineers' Week, celebrated nationally as well as locally?

"We do have objectives beyond the simple satisfaction of ego.

"Twenty-five years ago a large percentage of engineers practiced as individuals or as part of a consulting firm. Government and public alike thought of them much as they did lawyers.

"Since then, government and industry have employed a greater and greater proportion of the practicing engineers, so that today three out of four engineers are working for one or the other. Taft-Hartley legislation high-lighted the change in attitude of the public, when that legislation included our profession under the network of safeguards designed for 'labor.' (I use that word with no derogatory intent). The result has been actual restriction of our rights to exchange ideas freely at all levels of professional employment.

"It is to reestablish in the minds of everyone, particularly our legislators, the professional character, the basically creative nature of engineering, that this Week's promotion efforts are designed.

"In Fort Wayne, we have this as our first objective. We have also incorporated two others. One, to bring to our youth an insight into the opportunities and obligations offered by the engineering profession; two, to devise and provide for the engineers themselves means to broaden themselves both in a greater understanding of public affairs and through some service to their community."

Our six-part program, we believe, touched all of these objectives.

I would be most happy to hear other ideas on the proper objectives for next year's celebration.

R. P. Cheesman, P. E.,
Ft. Wayne, Ind.

More Patents and P.E.s . . .

Dear Editor:

In the May issue appeared a letter from Leonard M. Todd discussing some of the aspects of patent lawyers practicing engineering. Since the remarks are very critical of the patent lawyer field and since I have had considerable contacts with patent lawyers on patent work, my first reaction was that either I had been fortunate in dealing with a good patent lawyer, or there is a condition existing that is not familiar to me. I felt that for my own information I should investigate what my patent lawyer has to say on the subject and the following remarks are the result of a conversation with him.

Patent lawyers are, first of all, men who have been licensed to practice general law in the state where they hold license. Their function is to take an idea submitted to them by a client and by properly wording and describing it, to submit it to the Patent Office for patent. The original conception of the idea is by the client and the responsibility for design of the product is the client's and this information is brought to the patent lawyer. If the patent lawyer is so equipped to develop original ideas, then he would be an inventor in his own right and this field is not restricted to any profession or group of people. Since the patent lawyer's function is not the conception of the idea or the development of it, it does not seem conceivable that he is practicing engineering in his services to the client.

The attitude of the Patent Office toward a professional engineer is another thing and if it is the attitude of the Patent Office that the professional engineer is not regarded highly, it is either that the professional engineer has not exercised proper action on his own part to result in high regard, or there exist in the Patent Office individuals who for some personal reason have an attitude unfavorable to the professional engineer. It is not conceivable that any office in the Government would single out any group of people and as a policy have an unfavorable attitude toward them. If this attitude does exist among any of the employees, it is certainly the responsibility of our National Office of N.S.P.E. to approach the Patent Office and obtain a statement.

I cannot feel that the criticisms of the patent lawyer are justified and it is for this reason I have found it necessary to send you this letter to give you my views.

Paul Berg, P. E.,
Ft. Wayne, Ind.

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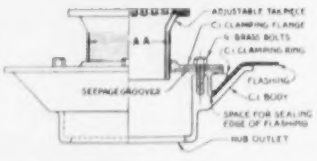

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The Utilities' Job . . .

Dear Editor:

Our anonymous friend ("P.E.'s As Strikebreakers," Letters, AE, March, 1955) must find another field of endeavor if he is not willing to serve his company for the welfare and safety of the community that his utility serves.

As the lineman climbs poles in rain, snow or sleet to mend broken wires, as the cable splicer risks his life underground to repair cables, as the oilers, firemen, engineers and switchboard operators stick to their posts during emergencies, so must he dedicate himself to uninterrupted service to his fellow man regardless of his personal discomfort.

A utility is not a factory or an office or a bank where business starts at eight and stops at five because hospitals, fire alarms, traffic lights, pumping stations, telephones operate twenty-four hours a day, seven days a week, fifty-two weeks a year, come hell or high water and they are supplied from power houses, operated by a utility which is dedicated to serve the public.

He just does not belong.

EDWARD J. WHITE, P. E.,
Newark, N. J.

$20 Words . . .

Dear Editor:

It amused me to read, some months ago, an item on page six of the December issue, referring to the drive launched by the National Association of Service Writers and New York University, to make science news "more meaningful to the public." The idea is very good, so why don't you practice it? To wit, read page nine where this appears: "In the time dimension, survival depends upon the balance we maintain; strength is "catabolic without wisdom for direction, etc."

I guess I'll have to go back to the university, because my vocabulary is too limited. The word "catabolic" doesn't register, and the item is sure not in line with the first quotation.

H. D. CRANMER, P. E.,
Clearwater, Fla.

► Should not the AE which, after all, is not a magazine for the general public, and Charles A. Lindbergh, who authored the quote, be allowed a "catabolic" now and then?—*Editor.*

Welcomed Duty . . .

Dear Editor:

I read with interest, the letter from Dean R. L. Sweigert, of the Georgia Institute of Technology, published in the March issue of the *American Engineer* relative to "Military Deferments." From time to time, I have seen letters or magazine articles on the same subject.

Personally, I think most of these writers take sort of a negative position; I would recommend a more constructive attitude under the heading of "Military Opportunities."

Let us start on the basis that every young man who is physically fit, owes three years of service to his country in return for his privileges of United States citizenship, with the liberties and opportunities that we enjoy in this country compared to those in most other parts of the world.

That should bring up the question, not of "How can I get deferred?" but rather

(Continued on page 40)

HALF the world is half asleep! Men who could be making *twice* their present salaries are coasting along, hoping for promotions but doing nothing to bring themselves forcefully to the attention of management.

They're *wasting* the most fruitful years of their business lives . . . throwing away thousands of dollars they may never be able to make up. And, oddly enough, they don't realize—even remotely—the tragic consequences of their failure to forge ahead while time is still on their side.

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PROFESSIONAL NEWS IN CAPSULE FORM

A Roundup of Late Events for Professional Engineers

H. J. Hunt Is Among Wisconsin Honorees

Henry J. Hunt, vice president of Mead and Hunt, Inc., Madison, Wisconsin, consulting engineers, and a member of the WSPE and NSPE, was one of five University of Wisconsin College of Engineering graduates who were honored for outstanding accomplishments during the Wisconsin Engineers Day celebration on May 6. Mr. Hunt received his B.S. in C.E. in 1906 and his professional degree in 1912. He has designed and constructed many water power and steam power plants, transmission lines, water supply systems, and sewerage works, and he is the author of many technical papers.

Other Wisconsin graduates who received citations were: Gordon Fox, vice president, Freyn Engineering Company, Chicago; Ralph J. Kraut, president, Giddings and Lewis Machine Tool Company, Fond du Lac, Wis.; Irving L. Wade, general superintendent, Commonwealth Edison Company, Chicago; and Kenneth M. Watson, vice president, Pure Oil Company, Crystal Lake, Ill.

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Hubler To Leave Washington University

J. W. Hubler, head of the Department of Civil Engineering at Washington University, St. Louis, Missouri, has resigned to accept a consulting engineering position with Macomber Incorporated, steel fabricators of Canton, Ohio.

Professor Hubler, who has been the C.E. Department head since 1947, is president of the Missouri Society of Professional Engineers and belongs to numerous other professional and civic groups. He holds three civil engineering degrees from Purdue University and one degree from Yale University.

AIEE Honors Gorham

Robert C. Gorham, professor of electrical engineering at the University of Pittsburgh, has been named a Fellow of the American Institute of Electrical Engineers for "diversified developmental work as an adjunct to electrical engineering education," according to N. S. Hibshman, AIEE secretary.

Professor Gorham, who is the author of *Power Economics for Engineering Students* and many papers in the electrical engineering field, is also a member of the Pennsylvania SPE, NSPE, and the American Society for Engineering Education.

"Batteries? Mine's electric."

Technology Lauded In New Book

"Technology is our primary resource. Without it all other resources would be economically nonexistent," according to Dr. J. Frederic Dewhurst, leading economist and executive director of the Twentieth Century Fund. This is one of the conclusions noted in the Fund's recently-published *America's Needs and Resources: A New Survey*.

The new survey is a completely revised and enlarged version of a study that originally appeared in 1947. Among the findings noted is the fact that "American productivity, meaning the average output per hour of work, is increasing so rapidly that if present rates continue, in another century we shall be able to produce as much in one 7-hour day as we now produce in a 40-hour week."

Three Patents in One Week

S. S. Aidlin, a New York City consulting engineer and member of the New York State SPE, has recently set a record by receiving three patents in the same week. Two of the patents issued to Mr. Aidlin are concerned with a detector device for fire alarm systems. The third patent covers a personal warning siren which may be carried in a pocket or handbag and will sound a highly audible alarm if the carrier desires help.

Glaeser Wins Medal

Alfred L. Glaeser, a prominent member of the Delaware SPE and NSPE, has been awarded the 75th Anniversary Medal of the American Society of Mechanical Engineers as the engineer in Delaware "who has done most to further the aims and objectives" of the Society. Mr. Glaeser is a mechanical engineer specializing in the design of power equipment and steam generators. He is a graduate of Stevens Institute of

Technology (M.S. degree), and he also attended Columbia University.

❁

Engineering Building Named for Roy Seaton

The engineering building at Kansas State College, Manhattan, Kan., has been formally named Seaton Hall to honor Roy A. Seaton, dean emeritus of the School of Engineering and Architecture. A 1904 K-State graduate, Dean Seaton was associated with the college from that date until his retirement in 1954.

He is a member of NSPE, a life member of the Kansas Engineering Society, and he has been chairman of the Kansas Registration Board since it was organized in 1931.

❁

National Science Foundation To Study College Research

More than 1,000 United States universities and colleges have been asked to take part in a National Science Foundation survey of the scientific research expenditures and faculty research activities, according to an announcement by Dr. Alan T. Waterman, NSF director.

The educational institutions are being asked to provide information on: (1) total annual expenditures for research, source of such funds, and subject fields in which research is conducted; and (2) the number of scientists on their staffs—both faculty members and researchers—and the extent to which these scientists are engaged in research.

Previous estimates made by the Foundation have indicated that the total Federal support of research at educational institutions amounts to about $300 million per year, with about $150 million of the total spent in special purpose research centers managed by the universities for various Government agencies. The contributions of the schools themselves to their research has been variously estimated from $20 million to over $100 million annually. Additional sizable amounts come from industry, foundations, and other private groups.

❁

Delaware Highway Post To W. B. McKendrick

It has been announced by the Delaware State Highway Department that Walter B. McKendrick, Jr., has succeeded Col. W. A. McWilliams following the latter's retirement as chief engineer of the Department.

(Continued on page 8)

Those three mice

...wouldn't get to first base

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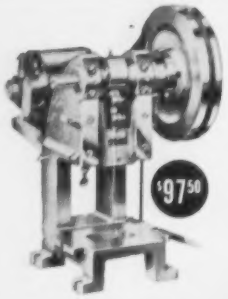

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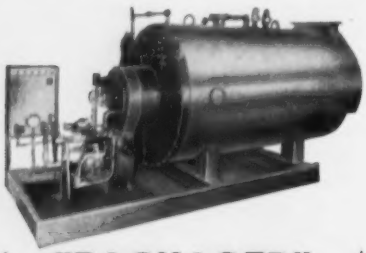

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Briefs

(Continued from page 7)

Both of the men have been active in the Delaware Society of Professional Engineers and NSPE. Col. McWilliams, who has accepted a post as project engineer on the staff of the Nello L. Teer Company, is an NSPE national director at the present time. Mr. McKendrick is a director of the Delaware Society. And both are also active in many other professional groups.

Col. McWilliam's first assignment in his new post will be concerned with a United States Government project in Iceland.

New Engineering Dean At West Virginia U.

Chester A. Arents, coordinator of research and professor of mechanical engineering at Illinois Institute of Technology in Chicago, has been named to succeed Roland Parker Davis as dean of the College of Engineering and Mechanic Arts at West Virginia University, according to Dr. Irvin Stewart, university president.

Dean Davis, who has been on the teaching staff at West Virginia for forty-four years, is scheduled to retire on June 30. A member of many professional and technical organizations, he was active in establishing the West Virginia Society of Professional Engineers and served as its fifth president in 1939. He is also a consultant on bridges for the State Road Commission.

Professor Arents, who will become dean on July 1, is a nationally known consulting engineer as well as a teacher. He is registered in both Illinois and Oregon and has been an active member of the Illinois SPE, NSPE, and many other engineering groups.

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Professor Babbitt Leaves For Rio Post

Harold E. Babbitt, a well-known NSPE member who retired last fall as professor of sanitary engineering at the University of Illinois, recently left for Rio de Janeiro under Foreign Operations Administration auspices. In Rio Professor Babbitt will assume the post of an educationist-sanitary engineer with the United States Government mission, and his responsibilities will be concerned with the expansion and improvement of sanitary engineering education in Brazil.

E. W. Carlton Takes J. B. Butler's Post

Professor E. W. Carlton of the Civil Engineering Department, Missouri School of Mines and Metallurgy, Rolla, has been appointed chairman of the Department to succeed the late Professor Joe B. Butler. The appointment was made by Dr. Elmer Ellis, acting president of the University of Missouri, on the recommendation of Dean Curtis L. Wilson of the School of Mines.

Professor Carlton is a past president of the Missouri Society of Professional Engineers, and he is currently serving as chairman of the Young Engineers Committee of the National Society. He is a member of the board of directors of the American Society of Civil Engineers. Active in Rolla community affairs, he is also chairman of the Mayor's Planning Committee.

Glenn Martin Institute Dedicated at Maryland

Dean S. S. Steinberg of the College of Engineering at the University of Maryland has announced the recent dedication of the Glenn L. Martin Institute of Technology on the College Park campus. The institute consists of eight buildings erected within the last six years at a cost of $8,500,000. The central unit is the College of Engineering with its Departments of Aeronautical, Chemical, Civil, Electrical, and Mechanical Engineering, the Institute for Fluid Dynamics and Applied Mathematics, and the Wind Tunnel. It also includes the Institute of Molecular Physics and the Departments of Chemistry, Mathematics and Physics.

American Engineer

The Magazine of the Registered Professional Engineer

VOLUME TWENTY-FIVE NUMBER SIX

An Exclusive AE Interview with VANNEVAR BUSH

Famed Engineer and Scientist and President, the Carnegie Institution of Washington

Q: In view of your approaching retirement at the end of this year as president of the Carengie Institution of Washington, Dr. Bush, would you give us your idea of some of the most outstanding achievements of the Institution?

A: Well, I think that at least a partial answer to that question can be found in the article I did for the *American Engineer* in May of 1953. As I pointed out then, one of the most useful and important accomplishments arising from the Carnegie Institution's basic research work was the optical-glass production program directed by Carnegie's Arthur L. Day for the War Industries Board during World War I. That program was made possible by a new annealing technique developed here, and the determination of a simple empirical rule for the release of stress in plastic substances, and the practical invention of radar traces back to the 1925 experiments in the use of electro-magnetic pulses for observation of the ionosphere by Merle A. Tuve and Gregory Breit.

Recently some of our most exciting discoveries have come in the field of radio astronomy. You have probably been reading about the radio waves from the vicinity of the planet, Jupiter, that have been detected lately by Bernard F. Burke and Kenneth L. Franklin. While there is as yet no positive explanation for these sounds, which are much like the bursts of static produced on ordinary radio receivers, the conjecture is that they could be caused by the Jovian atmospheric equivalent of thunderstorms, though they would have to be on a much greater scale than the storms we know.

Q: In this same line, can you make any predic-

What About . . .

Our Research Programs . . . Science and Culture . . . Technological Education in the United States . . . the Teacher Shortage . . . An Engineer "Shortage" . . . Selective Service Deferments . . . Security?

◄ Dr. Bush is shown at the beginning of the interview sitting at his desk in front of an impressive bust of Andrew Carnegie.

Kenneth E. Trombley, Editor of the *American Engineer*, left, and staff member, Miss Mary Margaret Milbrath, discuss interview questions with Dr. Bush.

tions as to outstanding scientific achievements that should result in the next several years?

A: That is pretty difficult to answer. So much that is very important in basic research is going on that it is hard to single out any one potential development. As I just mentioned, radio astronomy is going to be a very important field, and its study will add immeasurably to our knowledge of the universe.

Then, though it is somewhat removed from the realm of engineering, there is the remarkable work that is being done in studying the genetics of viruses. We need to understand a lot more about viruses, about their mutations and inheritance characteristics. Some excellent work has been and is being done in this field by such men as Alfred Hershey. Up at Cold Spring Harbor on Long Island where the work of our Department of Genetics is carried out, they are actually crossing viruses in order to observe their genetic performance, and I am sure the results of these studies are going to be lastingly beneficial to all of us. As you know, for instance, the use of a so-called "safe" live virus in inoculation against a specific disease can be much more effective than the use of a dead one.

All in all, I should say that the scientific accomplishments of tomorrow are going to be very great and that the horizons are still practically unlimited.

Q: **Coming back to engineering, Dr. Bush, do you feel that engineers and other practical scientists are making the best use of the fundamental scientific facts that such basic research organizations as the Carnegie Institution provide? Or is there extensive validity to the sometimes-heard criticism that too much industrial development time is being devoted to "$100-ideas" while potentially more important ideas are let slide?**

A: In answer to that, I would say that our basic research is certainly being used and used well to the extent that its results and conclusions are available. Sometimes it is hard to keep up with all that is being done. I think, however, that the real problem here is that there still is not enough support for basic research in this country. And the "$100-idea" criticism may possibly arise from the fact that the fundamental scientific data provided in a given situation simply do not permit of immediate practical development.

The emphasis that the National Science Foundation is now giving to basic research is a big step in the right direction. We must all strive to improve our fundamental research, and much more support ought certainly to be given to it.

Q: **In this same vein, do you feel that research grants by industry to colleges and universities are too restricted? Do you think it would be feasible and possibly more productive for industry to make more general grants to educational institutions?**

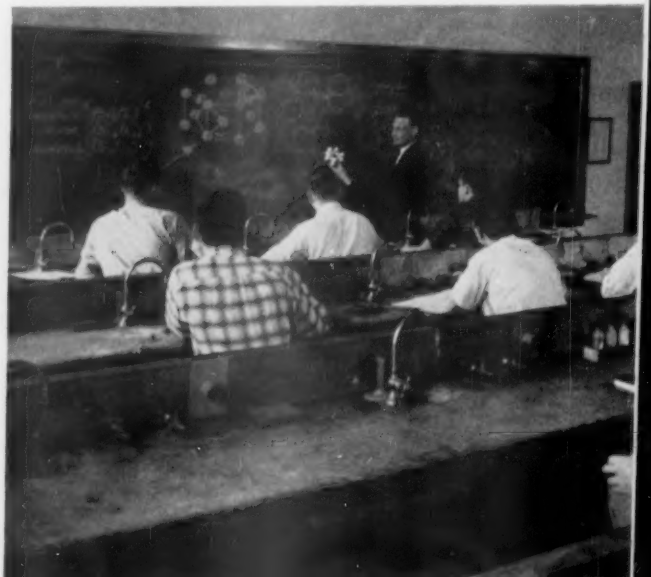
A: I do feel definitely that industrial grants to universities are often too closely defined. Part of this may be attributable to the project system, which I myself introduced during the war and which has many, many points in its favor. In a peacetime atmosphere, however, I think it would be a fine thing if we could be more liberal with at least some of the industrial grants, and some of the Government grants, too.

I particularly like the British system of allocating Government support for research in the universities. There Parliament makes one general appropriation which is allocated by one Government Board to the various universities for use in their research programs as they see fit. I doubt, however, whether such a system would work well in our country.

Q: **Frequently we hear the criticism that the greatest discoveries in the basic research area are always made by Europeans, like Einstein, and that the climate of scientific education in the United States is so saturated with the practical that no such geniuses are likely to develop here. Do you think this is true? Or do you feel that America can produce an Einstein?**

A: It is quite true that historically we have leaned on

Dr. Bush says that one of the greatest problems facing the nation is the growing loss of teachers to industry.



Europe for basic research even up to the outbreak of World War II. When I was a young man it was the dream of every fledgling engineer and scientist to complete his education abroad—most commonly in Germany. There is no doubt that the Europeans held the lead in fundamental research up to the war.—Britain, for instance, was pre-eminent in fundamental physics.—But the situation has been changing since the war. Now we are in the lead in many fields and at least holding our own in others, and you will notice that today more and more people are coming from abroad to study in this country.

The trouble has been that in this country the climate of public opinion has not been conducive to careers in philosophy and pure science. The kudos have always been given to the man who does the spectacular applied job here, whereas the pure scientist and the classical philosopher are looked up to more in Europe. There has, however, been a slow but perceptible alteration in the public attitude of the United States lately, and that is a good sign. The engineer, we must remember, is also a contributor to the general public opinion, and it is up to him in no small measure to help change the intellectual climate so that we can, as you say, "produce an Einstein."

Q: **In that article you have mentioned which appeared in the *American Engineer* two years ago, you wrote that the pursuit of science "has**

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Can our technological institutions keep up with the demands upon them? Shown is the recently completed Glenn L. Martin Institute of Technology at the University of Maryland.

a cultural value worthy of man's best efforts." Do you believe that part of this problem we have been discussing is that there is perhaps too great a tendency in the public mind to define an absolute separation between culture and science and an unwillingness to accept science as a definite part of culture?

A: Definitely. *Culture* is a tricky word, but in the generally accepted sense it does and should cover science as well as the humanities. It is just that the man in the street thinks merely of automobiles or washing machines or a lot of new gadgets when he hears the word, *science*. And this is something that we should try to change so that the broader view of science as an integral part of culture becomes more widely held.

Q: **One of the admittedly great problems facing the nation today is the maintenance of high standards of technological education, particularly in the face of the growing loss of teachers to industry for financial reasons. Do you have any comments on this situation?**

A: Well, the whole problem of education is a very big one. You know it is the general philosophy of education in America that every youngster should have as much education as he can absorb, and that is a very good principle. But sometimes we tend to distort that philosophy to the point where it is claimed that every person should have exactly as much education as every other person, exactly the same number of degrees, and so on. Consequently we get people in advanced courses who have neither the ability nor the personal interest to handle the work involved, and this tends to waste teaching time and to hold back the progress of the brighter students. I suppose I rather lean to a Jeffersonian approach to the whole problem of education. You will recall that Jefferson's idea was that everybody in the country should have the opportunity for a good basic education, that nobody should be denied the three R's, but that progress from grade school into high school, college, and so on should be based strictly on proof of the student's scholastic qualifications.

When we insist on educating everybody through college regardless of scholastic aptitude, we are trying to train too many. One reason, as a matter of fact, for the low salaries in the teaching profession, particularly in the higher levels, is that the whole financial burden of mass education is becoming too great to bear; and thus the lower salaries offered become a necessity.

Another reason why we are losing good teachers from grammar school right on through the university is that teachers and professors as a group have lost the prestige they used to have. In the smaller towns particularly, the teachers are not looked up to as they once were; and so many qualified persons who would make excellent instructors go into other professions where they receive more recognition and respect.

Q: **Do you feel that the nationwide shortage of engineers is a true one? Or is it more a question of poor utilization of the talent available?**

A: Undoubtedly there is a shortage today. You can check out the tremendous demand for engineers simply by looking at the newspaper ads for them. I have been somewhat of two minds on this whole question, though, and I think we might well say that the shortage is part real and part illusory. By saying it is part illusory I mean that perhaps we may be trying to do far too many things at once in the technological field and that we could tighten up the spread of our engineering talent and perhaps eliminate some research programs. Also, I think there is an over-emphasis on degrees in the demands of employers. Too many firms demand Ph.D.'s for work that possibly a good mechanic could handle, and we ought to give that mechanic his chance. In this regard there is certainly a place for the man trained in the technical trade institute. And I also like to see a man have a chance to advance on the job through work and study. The opportunity to work his way into a profession should not be denied to the man with real talent.

Q: **What is your opinion on the question of Selective Service deferments for students in the sciences? Much is being made of the interruption of graduate study by the draft. Do you feel that the loss to technological advance is actually as great as is claimed by the advocates of deferment through the completion of graduate studies?**

A: Let me say that I have absolutely no objection to the calling up of any young man studying in the scientific field, even if he is making exceptional progress in his studies, *provided* that during his term of service his scientific talents are put to use. When that is the case, the young man actually derives much good experience through his military service, and the country is benefited as well. What I do object to violently is the complete interruption of a young man's scientific or engineering work by military service, so that he perhaps ends up selling shoes in the commissary. We simply cannot tolerate the military's wasting scientific talent this way when we are in such a tense competition with Russia.

***Q:* Then what about this so-called "numbers race" with Russia? Do you think the strides they are making are as great as the numbers of engineers and scientists they are reporting might indicate?**

A: Well, I believe the figures as to the number of graduates are accurate. We can't afford not to believe it. I really can't say too much, however, about the quality. I was in Russia in 1928, and the engineering training there was terrible then, but I understand that they have made considerable progress since that time. Again, we have to credit this for our own good.

***Q:* Coming back to the United States now, Dr. Bush, do you believe that there is any justification for the charge that many young engineers and scientists today "want to go too far too fast" when they finish their schooling?**

A: No, indeed. My sympathy is all with the young fellow. If he is aiming for the top — more power to him. I certainly do not hold with any who would criticize the young engineer for going out and making all the money he can. Of course, he should not confuse ambition with cockiness or conceit, which will hamper him in the long run. And it is a good idea to guard against swapping jobs too often, which can spoil a career. The only really big criticism I can make of the youth of today is that too many are looking for security. You have to be willing to take chances to get any place.

***Q:* We have noted that last October you were quoted as telling a House of Representatives subcommittee on Government Operations that the Joint Chiefs of Staff were not "seeking or getting scientific advice in their national security planning" and that therefore the United States was a year or two behind where it ought to be in strengthening its continental defenses against air attack. Is this still the case? Or do you feel that some progress has been made?**

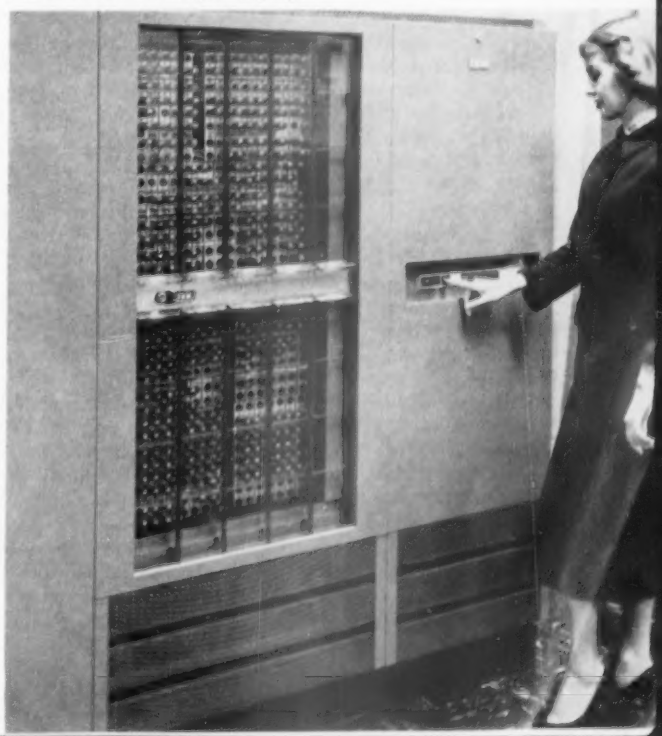
A: I think that we are now doing much better in connection with the problem of continental defenses, although we are still not strong enough. Also I feel that the relationship between the military and the civilian scientists has improved considerably over the last six months. I certainly want to make it clear that I have not been criticizing military men as such. In my career I have known no body of professional men who are more satisfactory to work with and I have formed many enduring friendships among them. My chief criticism and complaint has been against the organizational setup which has prevented the Joint Chiefs of Staff from giving their full time to the over-all planning function since they also have line responsibilities as chiefs of the individual services. This whole question of organization for military planning and effective defense is very complex, and I could talk for hours on it. The main point is that we owe ourselves the best organization possible and that we must continually strive for better and better working relationships. And I do feel that the entire situation could be improved quite considerably if more of the recommendations of the Rockefeller Committee on Department of Defense Organization of which I was a member, were put into effect.

***Q:* You have also criticized the administration of the Government security program and scored its handling as having a demoralizing effect upon the Nation's scientists. Do you have any recommendations for improving the situation? And is not a very rigid security program the price that must be paid to maintain technological superiority in a tense world?**

A: First let me say that I believe this situation has also been improving during the last six months. We have gotten over our hysteria and the trend is now in a reasonable direction. Certainly we must continue to be security-conscious, but intelligently so.

There is no doubt that the enemy relies chiefly on weapons of penetration and subversion to weaken us. One objective is obviously to steal our secrets. Among those who have had access to secret information there admittedly have been a few traitors—but only a few. We must guard against such traitors with all our skill and determination. But on the other hand, we voluntarily and often foolishly tell the world almost all we know scientifically without the agency of "inside" traitors. We do this through technical articles, budget presentations, the release of testimony, various open court hearings, and even in advertisements. Skilled analysts can always put such data together so that telling conclusions can be drawn even without espionage. We must assuredly keep the

One highlight of Dr. Bush's long career as an engineer was his design of a machine for solving differential equations. Pictured is IBM's new "giant brain," designed for commercial use. It is an electronic data processing machine, and cathode ray tubes and magnetic cores are among the kinds of "memory" employed.



Qualified engineer and scientist draftees should continue their specialties in the services, Dr. Bush thinks. Shown are scientists at work at the Snow, Ice and Permafrost Research Establishment, Wilmette, Ill. The project is directed by the Army's Corps of Engineers.

traitor and spy out of our secret councils and our laboratories and factories. But we also very definitely need to draw a clear line between the information which the electorate must have for its reasoned judgment and the technical and military information which is not strictly necessary for that purpose.

I do think the danger of personal penetration into Government and our various organizations for the purpose of influencing decisions and policies has lessened somewhat because we are alert to it and are no longer as gullible as we once were, but we must never relax our vigilance.

As to the security system itself, I think what we need is not so much an overhaul of the old processes, as a completely new and well-defined system. Basically, what I would like to see would be a new system built unhurriedly from the ground up by a competent body of men working under an unrestricted assignment—not just a collection of scientists, but representative persons completely divorced from politics. The work of this group should be so thorough that it will bring the whole problem of foreign penetration and domestic disloyalty under control without "witch-hunting" or imperiling the careers of loyal public servants. We not only need to get rid of our enemies; we must also, through our security system, encourage and protect the honest and loyal persons who work on matters important for our safety and prosperity.

I think that we could easily take a lesson from our court system with the various protections offered to a man until he is proven guilty. Under criminal law, before a man can be jailed and forced to defend himself against serious charges, he must be indicted by a grand jury; and that jury must be convinced that the district attorney has enough strong evidence to bring the case into court. I think that in our loyalty system we need something of the equivalent of the grand jury, perhaps a group selected by lot from men in civil service in the way that grand juries are selected by lot from among the citizens.

Also, I believe that when the method of handling loyalty cases is revised, the burden of a man's having to bear the full expense of his own defense should be lifted. In court martial cases, the Government furnishes a soldier with counsel. I am in favor of this same arrangement, giving the accused a sufficient latitude in selection of his counsel, in Government security cases. A man could, of course, bring in his own attorneys to supplement the Government-furnished counselors; but in this way a man without sufficient funds of his own would also be protected.

Meanwhile, I think we can be glad that the public has been taking a more reasonable view of the security situation. I do not believe there was any general realization of the demoralization that has been felt among the scientific community. This did worry me very much as it militates against a man's giving his best work where it is needed, but I hope that we shall now keep moving along on the right track. We have to remember that scientists—and also engineers—wouldn't belong to their particular professions if they did not have a certain amount of independence in their makeup. And this is not always well understood; sometimes—as recently—it is misconstrued as a desire for special privilege, which definitely is not the case.

Q: **Dr. Bush, before we conclude this interview, would you tell us what you believe are the most important elements to be considered in maintaining the professional status of engineering?**

A: As I have said many times in the past, the true spirit of any profession has always been ministration to the people. A career or vocational group that does not maintain that spirit as its basic motivation will not endure very long as a profession. The chief business of the engineering profession is, of course, the application of science in an efficient manner to the needs of mankind. This work, which depends both on the cloisters of science and on the competitive activity of the aggressive business world, must be tempered by a high idealism and a sense of responsibility to the public to maintain its professional character.

We must beware, too, of any trends that lead us toward a sort of trade unionism that undercuts the independence of the professional man. And we must be careful to see that the true spirit of professionalism is passed on to the younger men just entering the profession. It is not enough to leave this to the industrial organizations in which they are starting their work because the inculcation of the principles of a profession can come only from those who themselves have achieved a full grasp of its proper function in society. The maintenance of the professional status of the engineer is the job of each individual member of the profession, and each one must take his full share of responsibility in service to the people, whether directly or indirectly, and in passing on these professional ideals to his successors.—***End.***

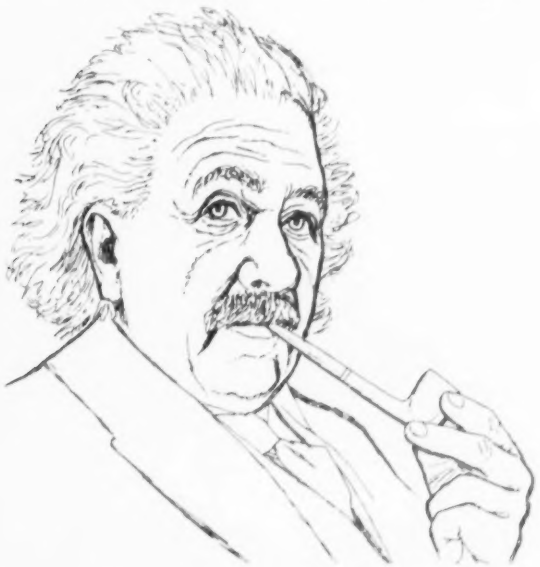
$E=mc^2$

The Influence of Einstein

"In our times scientists and engineers carry particular moral responsibility, because the development of military means of mass destruction is within their sphere of activity." Written in 1950, these were the words of the late Albert Einstein, the theoretical physicist whose genius contributed so greatly and uniquely to the advance of modern science and whose greatest fear in his later years was the dread that perhaps man would misuse the tremendous new power placed in his hands with the splitting of the atom—one of the many practical developments resulting from his famous development of relativity theory.

Since his death on April 18th, the story of Einstein's life has been told and retold—how he supported himself as a math and physics teacher and later as a patent examiner in Switzerland in his early days; how he became director of the Kaiser Wilhelm Physical Institute in Berlin and a member of the Royal Prussian Academy of Science; how he made many other important scientific contributions in addition to his famous special and generalized theories of relativity, such as his explanation of the Brownian motion phenomena, the consequent enunciation of the law of photo-electric effect, and his contribution to the molecular kinetic theory of heat; and how, with the advent of the Nazis, he left Germany, the land of his birth and earlier acclaim, for England and eventually the United States. The theory of relativity from which is derived the famous, dramatically simple formula, $E = mc^2$, and the fascinating concept of the four-dimensional space-time continuum have been explained over and over again in language keyed to the layman's understanding. A new spurt of interest in his yet unproved "unified field" theory has been aroused, and countless tributes have been voiced by laymen and scientists alike.

The impact of Albert Einstein will be felt for many generations to come in areas far removed from the particularly defined field of fundamental physics. He himself said that, "The whole of science is nothing more than a refinement of everyday thinking. It is for this reason that the critical thinking of the physicist cannot possibly be restricted to the examination of the concepts of his own specific field." Perhaps more than any other man of science, the engineer who finds and develops the practical applications of fundamental discoveries is aware of the soundness of this statement. It is only because there is interplay and exchange among the basic and the applied sciences that he can do his work effectively.



As Einstein has been called "the father of the atom bomb," an appellation he abhorred, so he might also be given the more positive title of "the father of nuclear engineering." Certainly this vast new field with its many exciting challenges and opportunities for the engineer would not have been opened without benefit of his basic discoveries. The heightened demand for engineers in all branches of the profession can also be attributed at least in part to the continually burgeoning scientific revolution first touched off in 1905 when his restricted theory of relativity was originally published.

His influence has struck deeply into scientific curricula in the schools, where Newton's long relied upon laws of motion were found to have pulled up somewhat short of ultimate scientific truth, although Einstein himself was quick to point out that "what we have gained up till now would have been impossible without Newton's clear system."

And in considering his influence in the scholastic world, it is interesting to note that Einstein himself expressed some concern about the much-discussed question of over-specialization in study, a view that would undoubtedly elicit applause from the educators who advocate the broadening of engineering and scientific courses to allow for such subjects as the humanities. In 1936 he went on record as follows: "The school should always have as its aim that the young man leave it as a harmonious personality, not as a specialist. This in my opinion is true in a certain sense even for technical schools whose students will devote themselves to a quite definite profession. The development of general ability for independent thinking and judgment should always be placed foremost, not the acquisition of special knowledge. If a person masters the fundamentals of his subject and has learned to think and work independently, he will surely find his way and besides will better be able to adapt himself to progress and changes than the person whose training principally consists in the acquiring of detailed knowledge."

Einstein frequently liked to think of himself as a philosopher, even more than a scientist, although not all of his commentaries were as well received or as indisputable as his mathematically provable relativity thesis, and some of his outspoken views on political subjects brought equally hot rebukes. He was sympathetic to a socialist economy but admitted that there could be multitudinous problems involved in the achievement of what he considered an ideal state. He was an ardent advocate of world government, though recognizing the potential for tyranny in such a system; he admitted a fear of such

(*Continued on page 30*)

The Author Reminds Us That the Morality of Our Governments Reflects Our Own Collective Morality

The Engineer and Government

By FRANK G. CLEMENT,
Governor of the State of Tennessee

OUR hope lies in a reawakening of political and moral leadership, in a reexamination of our religious heritage and a reaffirmation of our moral code.

There are many people today, engineers included, I think, who want to believe that politics does not concern them. There are others who want to think that morality does not concern them. When man's survival may rest upon the prevailing morality in general as well as on the prevailing morality in politics in particular, this view is not just alarming. It could be fatal.

The problem is not only one for elected officials—politicians—in local, state, and national government, but one that puts a responsibility on all of us, and especially professional people.

There is the concern each of us has as an elector, an officer of government exercising the basic and powerful political authority of the ballot. There are also many other ways in which one may affect his government besides the use of the ballot. One may vote wisely and well, yet accomplish immorality by trying to corrupt the government's tax collector or other agent. This may also overturn such officials' pretensions of good citizenship.

There are exceptions, but generally the morality of our governments reflect our own collective morality.

Honest government is an exacting aim and trust, laid upon every public official. The success or lack of success of such efforts receives a great amount of public attention, but the prohibition against stealing is only *one* of the Ten Commandments and it is only a minor part of the traditional ethical code by which we live and by which we are governed, only one tenet of public ethics—of political morality. It may be, for all the conniving of a crooked politician at concealment, the most easily detected, or at least the most easily understood breach of morals.

What of a political morality that produces the hydrogen bomb, or that prepares atomic, bacteriological, and chemical warfare—to destroy whole cities, countries and continents—to destroy women, children—our civilization? We may say, "That is different!—That may be *necessary*. It is all very complicated."

It is very complicated, indeed. It is, in obvious ways, different, regardless of how compelling its expedience may become! We cannot dispute this *desperate* expedience.

BUT if morality of government—or morality in government—generally reflects the morality of the society it represents, then what is the morality out-of-government of the United States today? What should it be?

So much of government is engineering. Here a crane breaks ground for the new $65-million Mississippi River Bridge which will join the heart of New Orleans with the West Bank. From l. to r. are Mayor deLesseps S. Morrison of New Orleans; Capt. Neville Levy, chairman of the Mississippi River Bridge Authority, and George S. Covert, director of the Louisiana State Highway Department.

Perhaps most of us are conscious of and accept the prevailing historical interpretation of the years that succeeded the French Revolution near the end of the Eighteenth Century: the intellectual trend that brought to Western society and—after our War Between the States—to the United States a gradually growing secularism, a growing scientific modernism.

This country, and I'm sure many engineers were aware of it, along with the rest of the civilized world, continued to drift toward godless Materialism throughout the twenties and thirties and into the Second World War—perhaps it might be more accurate to say that this Materialism infiltrated us, infiltrated our institutions.

Back in those days, even in the established churches, leadership was taking a new look, so to speak, at the Bible. And generally there was reinterpretation to explain away its divinity and relax its disciplines.

The emphasis in religion, as in politics and society, then was upon this life and—in the view of the enthusiasts—its approaching perfection—and the manifest perfectibility of man.

The idea of economic man held sway in this country. It held sway in all the capitalistic countries of the West, as well as in Communistic U.S.S.R.—I should say, especially in the U.S.S.R.

There, the idea of man devoted only to the attainment and enjoyment of wealth, was elevated into a religious principle. And there, man was to create his own heaven through the communal ownership of property. Economic man was, and is, the god of Communist Russia. To be sure, the idea existed in this country, but it was modified by humanist ethics and Christian tradition. It served, however, generally to confuse our thinking for a long time.

Throughout the world, where Western culture was an influence, Humanism was a pervasive social creed from the middle of the 19th century onward to the present day.

BEFORE the Second World War most of its advocates found this view of things adequate enough. Even after World War I and the great depression, such was their sense of security, these heaven-on-earth brethren of ours saw nothing wrong with their world. But World War II shook their assurance. The atom bomb and the hydrogen bomb and a total ABC warfare, have, as I have said, given all of us pause—have dramatized once more in human history the fact that man is never sufficient unto himself.

We cannot fragment man's condition on earth and long endure—we cannot take his body and enshrine it and say this is all that counts—we cannot ordain his mind and give it exclusive worship. To do so does not elevate man. It creates a monster of him. Man unites the material with the spiritual, the natural with the supernatural. He walks on earth, but his mind gives passage to angels. He is an essential inhabitant of two worlds, a dual actor in the divine mystery of time and eternity. Without doubt the engineer in his familiarity with fundamental scientific facts is acutely aware of this inter-relation of the material and the spiritual.

The humanists and the liberal materialists were highly moral men and I suppose they still are—if there are any of them left. For a century they comprised the elite of our thinkers in economics and political philosophy, as well as in the exact sciences. Many of our political and industrial leaders were liberal materialists. Indeed, these men set the pace of their day, created the styles, it might be said, in social morals. Only, as you may remember, they abolished the word *moral!* That old word became taboo, and enlightened people said *social* or *antisocial.*

Pictured is the brilliant young Governor of Tennessee, Frank G. Clement. The popular official has been mentioned recently as possible Democratic Vice Presidential timber for 1956.

And they were all peaceful men—indeed, they made a fetish of peace—peace societies—peace conferences—peace alliances.

Then how is it that these arch priests of the cause of peace come up with the atom bomb and ABC warfare?

Morals do not exist for their own sake. When the humanist moralists forgot the source of their inherited moral code, they soon denied its supernatural ends and inevitably it lost meaning, and effect. That's what happened to the idealists who saw hope in Soviet Russian Communism—the disintegration of political morals in world affairs. It is easy to recognize gangsterism in the U.S.S.R. But Communism and its subversive technique, let us remember, did not originate in Russia, but in the capitals of western Europe—in Paris, in London, and in Berlin.

THE problem of peace in the world is ultimately a moral problem—and more specifically our morals as leaders of the free world against dictatorship, as the democratic bulwark against Communism, and as the Christian power, if you please, against the godless forces of evil.

Communism is a social cancer that has ravaged the world to great extent, whose riotous cells are too widespread and deeply-rooted for us, at this late date, to attempt surgery. Keeping ourselves in moral health, we must rather rely upon X-ray treatment—a supernatural X-ray. That X-ray is faith in God.

As educated men, professional leaders, the professional engineers of America can, at all levels of government, place a strong hand on the helm that will direct us along the path of true morality. And in areas other than government, the engineer can use his great influence and technical experience to shed light upon the darkness cast by a complicated atomic tomorrow.—***End.***

Honeywell Engineers Accept Company Offer After Strike and Quarrel with Trade Unions

THE Minneapolis Federation of Honeywell Engineers, affiliated with ESA, representing approximately 1,500 engineers and technicians employed by the Minneapolis-Honeywell Regulator Company, struck the company's plants on May 16. The strike followed a breakdown in negotiations over wage increases, the company making a final general increase offer of 2.8 per cent and the union insisting upon an increase of approximately 8 per cent. Other issues included demands for liberalized overtime pay for professional employees exempt from the Federal Wage-Hour Law, union participation in job evaluation, automatic upgrading practices and the amount allocated to individual merit increases.

After a week of picketing, the unionized engineers and technicians voted at a meeting the following Sunday to accept the company offer of a 2.8 per cent general salary increase. The vote was reported to be 505 to 239 for acceptance of the company's offer. This followed a previous vote of 448 to 8 to decline the company's offer and a 582 to 67 vote to authorize the union's executive board to call the strike.

"Battle of Leaflets"

The issues of the strike were almost obscured during the week-long walkout by a "battle of leaflets" and exchange of angry words between the ESA union and the AFL Central Labor Union, which refused to sanction the strike of the engineers and technicians. Local 1145 of the AFL Teamsters Union, which represents the production workers at the Minneapolis-Honeywell plants, declined to honor the picket lines and the production workers continued their employment during the strike.

Everett Taft, president of MFHE, attacked the lack of support by the teamsters, declaring that the company "is being aided and abetted by unnatural allies." The ESA-affiliated unit distributed a leaflet to the production workers entitled, "This Is Your Fight," declaring that "we are up against a union-busting management." The leaflet declared, "if we go down, it may be your turn next." Taft attacked the decision of the teamsters not to honor the picket line, stating: "Those self-styled labor statesmen who in past years have changed labor affiliation as readily as you or I might change our clothes would be well-advised not to throw stones in labor's house." His statement referred to a switch in affiliation from CIO to AFL two years previously by Robert Wishart, secretary-treasurer of the teamsters local.

WISHART stated that his union would not support the strike because the engineer-technician union is not affiliated with either the AFL or CIO. He said that the MFHE "is an independent organization—and it means just that, that it chooses to be independent of the labor movement except when it gets into trouble." Walter Cramond, Central Labor Union president, added: "We tried to get them to join with us, but they have chosen to remain independent except when they are on the brink of trouble. The Honeywell engineers have no quarrel with us. They choose to be independent and we recognize their right to be just that. We also recognize our right not to pour our steam into their fight and pull our people out in support of their independent picket line." The trade union spokesmen pointed out that the engineer-technician union had not affiliated with the AFL body as MFHE officers had previously promised to consider.

MFHE President Taft issued a statement accusing the officers of the teamsters union of engaging in "strike-breaking." He said outside truckers were guided through the picket lines and "hesitant drivers were induced to cross by job threats." Taft added, "This is strange behavior for union leaders. Does it reveal the true nature of Honeywell's 'good labor relations'? After such a performance, we ask where co-operation ceases and collusion begins."

Cramond retorted that the MFHE is a "Johnny-Come-Lately" in the local labor movement and again emphasized the "independent" status of the group. "You can't be an 'independent' 11 months out of the year and then call upon the whole labor movement which you want to be 'independent' of to support you in the 12th month when you get into trouble. The engineers should have learned this a long time ago."

The company issued a statement at the start of the strike, declaring that the unionized engineers wanted a straight percentage increase granted to all employees whether their performance justified it or not. "The amount of money spent annually to raise engineering salaries is not the real issue. The company feels that salary increases for engineering organization should be paid on the basis of increased job performance and responsibility."

THE statement added: "Honeywell now actually pays engineering salaries that range from about $4,000 per year for a young engineer just out of college to about $12,000 a year for men in straight engineering jobs without supervisory responsibilities.

"A negotiated general increase such as the one now offered is by no means the full picture on Honeywell salaries. The company has long had a program of individual salary increases which are earned by increases in performance or responsibility.

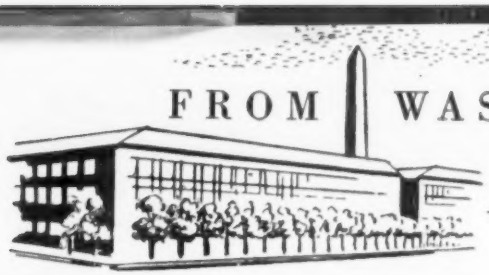
"In addition, Honeywell's steady growth over the years has continued to afford many opportunities for promotion to higher paid jobs.

"Thus the general increase now being offered to Honeywell engineers of 2.8 per cent is in addition to their opportunities for merit increases and promotion increases.

"One good indication of how engineering salaries compare nationally and how Honeywell is regarded as a place to work is shown by our engineering expansion. We have been able to hire additional engineers in competition with other major companies and in one of the tightest engineering markets ever known.

"During the past five years—when the federation was claiming Honeywell salaries were low—our engineering activities have grown steadily with more than 1,300 new engineers being added."

The same union had a week-long strike in 1950 which ended in a compromise pay settlement, and a near-strike last year which did not come off when the local teamsters union refused to sanction it. According to local sources, of the 1,500 employees represented by MFHE approximately 1,100 are qualified engineers and the others are technicians and draftsmen. MFHE claimed 943 members as of March, 1955.—***End.***



FROM WASHINGTON

By
Milton F. Lunch,
N.S.P.E.'s Legislative Analyst

EDUCATION, ENGINEERING AND N.R.P.

At the moment it appears that the Administration's military manpower-reserve training legislation is doomed. This unexpected turn of events, following hard on President Eisenhower's enthusiastic endorsement of the bill reported by the House Armed Services Committee, has thrown the Administration and Congressional leaders into a quandary. The military manpower program had an A-1 priority on the Administration agenda and reliance upon its successful passage was one of the props upon which a cut in the military forces was predicated.

The current situation results from a rebellious House of Representatives which simply refused to go along with the Administration's plan, even as watered down by the Armed Services Committee. Technically, the bill was not defeated on its merits; it was returned to the Speaker's desk and may be called up for consideration again. House leaders, however, have indicated that if the bill is brought back to the floor it will only suffer a direct defeat and be returned to Committee. House Minority Leader Joseph Martin of Massachusetts still entertains hope that a military manpower bill will finally be passed, but he admits that his expectation is based on what he regards as the urgency of such legislation. Senate leaders have announced that they will not take the initiative to rescue the legislation because they feel it would be futile for the Senate to pass a bill if the House is not prepared to takes similar action.

◄ Rep. Charles P. Nelson of Maine.

Rep. Graham A. Barden of N. C. ►

On the record, the bill went down when the House adopted amendments imposing anti-segregation requirements on National Guard units. When a compromise plan of Chairman Vinson of the Armed Services Committee, designed to eliminate the anti-segregation amendments, was defeated he called the bill off the floor, realizing that the Southern contingent would vote against a bill containing such provisions, and that this bloc of votes, combined with a substantial number opposed to the basic concept of the bill, would ensure its defeat.

A careful reading of the House debate indicates that the National Reserve Plan was doomed because a majority of the members were opposed to any compulsory military training program which might lead to adoption of Universal Military Training, or because they felt that the plan would disrupt educational processes at high school and college level, and that in a technological age specialized education is more important to national defense than military training. This attitude of placing the value of education above military training service was indicated by one member's insertion of a statement by Herbert Hoover: "The United States has only one-sixth of the world's population; yet the United States has 40 per cent of all the college graduates. Therein lies America's strength, and let no one Delilah-like shear us of that strength."

Throughout the debate repeated references were made to the role of engineers and scientists in defense activities. Representative Charles P. Nelson of Maine, a member of the Armed Services Committee, stated: "It (the bill) does not do anything to remedy this Nation's plight with regard to scientific and engineering personnel. . . . If we are going to have a scientific and engineering personnel . . . these boys must be able to plan their future, plan their education, plan their graduate work. We are woefully behind in scientific and engineering personnel."

(Please turn the page)

(Continued from previous page)

Representative Graham A. Barden of North Carolina argued along similar lines and offered an amendment, which was rejected, to permit young men attending college to obtain their military training by serving each summer during school vacation for four years and then serving one year in the Standby Reserve. He contended, in arguing for his plan: "We must have more scientifically trained men, more men who understand the speed of this age, because we cannot put out as many foot soldiers and depend on mass warfare any longer. You must be able to compete in speed, in science, and anybody who is thinking knows that the next war we have—and God forbid we ever have one, but if such should happen—anybody knows it will not be fought and won with brawn alone; it will be a brain contest of science, of electronics, atomic and kindred weapons. It will be a question of getting the high-speed jet bomber before it delivers its lethal cargo. If we cannot do that then the number of men will amount to little. In my opinion, our survival could very easily depend, as it has at times in the past, upon trained, skilled, and scientific minds."

Representative James Roosevelt of California objected that the bill "does not make use of and it provides no incentives for the young people of this country to stay in school and stay in college and work out their proficiencies along the line which will be something that they can take up afterward under civilian control rather than under military control." Statements by distinguished scientific leaders on the relationship between defense through scientific knowledge and application and through military training were inserted in the debate, including comments by such well-known names as Dr. Vannevar Bush, Dr. Harold Urey and Dr. Ralph E. Lapp.

◄ Rep. James Roosevelt of the State of California.

Dr. Leonard Carmichael, Sec'y., ► Nat'l. Smithsonian Institution.

Representative Carl T. Durham of North Carolina, also a member of the Armed Services Committee, even though opposed to his colleague's summer training amendment, argued against present policies with respect to engineering and science training: ". . . our problem in the matter of shortage of scientists is not at the bottom of this barrel, but at the top. Some day this House is going to be realistic and adopt a real manpower program. Until we do that, we are endangering the science and the scientific progress of this country. It is just as plain as that. Today we are deferring boys in college for 4 years. We deferred a large number of the 1,421,000 this year. Think of that. Most of them are deferred for 4 years. They come out of college and then we draft them and put them in the Army for 2 years. How in the world are you going to get a master's degree or doctor's degree with any such program as that? But that is what is happening. We have to approach this thing realistically by going down to the bottom of this barrel and trying to solve it by some formula that will make sense."

A reading of the full debate impresses one with the deep concern held by many members of Congress with respect to the importance of training and utilization of engineers and scientists in national defense affairs. Balanced against this deep concern is the evident feeling that this country's long-held tradition of "equality of service" is not to be lightly cast off. In the face of these opposing principles no solution was found; at least no solution acceptable to the majority of the House members.

Along more positive lines, the Director of Selective Service has announced the establishment of a National Selective Service Scientific Advisory Group to counsel with the Director on problems in the administration of the draft law with respect to engineering and scientific personnel. This development follows the spread of state scientific advisory committees from six a year ago to 39 today. The state bodies provide Selective Service boards with complete pertinent information on engineering, scientific and specialized personnel. The remaining states will establish the advisory committees as the need arises, it was declared. Under the state and national groups, Selective Service said, nearly 200 engineers, scientists and other highly qualified individuals have made their services available to the Selective Service System "in order to afford the whole scientific community the fullest opportunity to have the cases of individuals possessing critical skills or engaged in basic research or defense-supporting endeavors, most thoroughly considered."

The Chairman of the national group is Dr. Leonard Carmichael, Secretary, National Smithsonian Institution. Other members are: Dr. A. V. Astin, Director, National Bureau of Standards; Dr. Detlev W. Bronk, President, National Academy of Sciences and National Research Council; Brig. Gen. Carlton S. Dargush, Committee on Specialized Personnel, Office of Defense Mobilization; Dr. Jerome C. Hunsaker, Chairman, National Advisory Committee for Aeronautics; Dr. Francis W. Reichelderfer, Chief, Weather Bureau; Admiral Lewis L. Strauss, Chairman, Atomic Energy Commission; Dr. Alan Waterman, Director, National Science Foundation.

The Winner of the 1955 NSPE Award Comments Upon the Status of the Profession

1903-1955: My Professional Journey

By Andrey A. Potter, P.E.

Dean Emeritus of Engineering, Purdue University and President, Bituminous Coal Research, Inc.

Dean Andrey A. Potter, P.E., is well known in engineering circles. Others to receive the NSPE Award have been Herbert Hoover, D. B. Steinman, and Harry A. Winne.

As I am getting well started on the second mile of my professional journey, and as I compare present conditions with those when I began my career in 1903, I should like to report a few observations:

1. The more than fourfold growth of our profession during the past half-century has been accompanied by a keen appreciation on the part of the American public of the engineer as a vital factor in the life of this nation. Our profession, however, suffers by reason of the fact that too many engineers lack a sense of pride in their calling. Let me assure you that no professional group is held in higher public esteem than are the engineers.

2. Considering the importance of our profession, the present shortage of engineers may be attributed to several factors:

The large increase of engineering graduates during 1949 and 1950 led to ill-advised warnings by a governmental agency to vocational counsellors in secondary schools against the impending surplus of engineers. While this erroneous publicity was promptly corrected, the harm it did has not been erased.

Our draft policies have probably contributed to the shortage.

The seriousness of the present shortage of engineers can be corrected at least in part, by making better use of engineering talent. Too many engineering college graduates are even now performing services which could better be handled by subprofessional, technical institute-trained personnel, or by those from the schools of business. The quality of secondary school teachers is a most important factor. To attract high-grade people to secondary school teaching, their social as well as their economic status must be improved. Too few of the teachers in our public schools are given the social recognition they deserve.

The motivation of engineering college students must be improved so that a larger portion of the entering students graduate. Better counselling and better teachers for freshmen and sophomores are a definite responsibility of engineering education. Are too many of our engineering colleges, by reason of their interest in greater graduate enrollments and more research, utilizing largely candidates for advanced degrees and unimaginative older teachers in connection with undergraduate instruction?

3. Is there a tendency on the part of our profession to minimize the place of the art of engineering in engineering education? It is true that progress in our profession will require more engineers who have had sufficient basic scientific preparation for research, teaching, and other creative functions. It must be remembered, however, that more than two-thirds of engineers are concerned largely with construction, exploration, production, operation, and management functions which require familiarity with tools, machines, technical processes, and people.

4. Are engineers too apologetic about the cultural value of engineering education? W. E. Wickenden, as a result of his survey of engineering education, reported nearly thirty years ago that the engineering curricula devote about one-fourth of the total time to general studies, which have nothing to do with science or engineering, and that about half of the requirements for a Bachelor's degree in Engineering would apply to an A.B. degree in liberal arts. Aside from preparation for a career, engineering education is a modern form of general liberal education, acquainting the learner with the tools, processes, and methods which make our civilization outstanding. Cultured people are those who understand their environment—the world in which they live. Does general or liberal education acquaint the individual with his surroundings as well as does engineering education? It must also be remembered that knowledge and culture alone do not create happiness and well being in people who have not cultivated good will toward others. Engineers have a right to insist that engineering education cultivate in young people an appreciation of the sanctity of humanity and an understanding of the responsibilities of American citizenship.

5. Too few realize that the teacher is the key person in any educational process. Excellent educational buildings, well planned curricula, highly publicized administration, and even winning athletic teams are useless without good teachers. More and better educated engineers can become a reality if we make it possible for our colleges, universities, and public schools to attract to the teaching profession men and

(*Continued on page 40*)

During busy working hours senior executives seldom have time to just talk with young men about the business. Dana solved the problem by forming a discussion club when the top brass informally met those coming up through the ranks.

A Unique "Discussion Club" . . .

How Dana Trains Jr. Executives

By Ren McPherson,

Dana Corporation, Toledo, Ohio

DANA CORPORATION'S home offices for nearly three years have been the scene of a unique, self-generated experiment aimed at more quickly, thoroughly, and soundly indoctrinating prospective younger executives.

Simple in concept, the program revolves around a "discussion club," now composed of eight members, which meets on a regular monthly schedule during the fall, winter, and spring for informal question and answer sessions with members of Dana's top management staff.

These meetings got started a little over two years ago when several of us decided something should be done to make more readily available to us the mature thinking and broad experience of the older hands in the Dana organization.

Although we all had a certain amount of access to these men in the normal course of our work, it was naturally impossible for us to keep in day-to-day touch with them, and thereby glean comprehensively from all they had gone through.

Five young people from various departments who generally possessed the same background and had common interests, executive work responsibilities, and overall objectives, originally undertook to set up the program.

They came from the Engineering, Production, and Sales Departments, and included both staff and line men. Most had studied and were trained in engineering.

When the group was formed, we took our idea of having top management people submit to our questioning to J. E. Martin, now Dana President, then Executive Vice-President.

Mr. Martin not only gave us his blessing and encouragement, but agreed to be top management's representative at our first discussion session.

Management placed us under only one restriction: simply that our program be a wholly self-generated project, not one sponsored by the Corporation, so in no case could there arise a feeling of compulsion on the part of anyone concerned.

During the group's first year, a total of seven monthly meetings were held in the homes of members where an atmosphere of complete informality could be readily maintained.

Seven members of top management cooperated by submitting themselves to questioning and open discussion of the various and sundry subjects and problems with which each of them was specifically familiar.

In addition to President Martin, we were honored by having Mr. Charles A. Dana, Chairman of the Board, as one of our guest speakers during our second year.

OUR program has been blessed with complete forthrightness on the part of top management, as well as with sustained, unbroken interest among group members.

During the two years of meetings we have had discussions on such important subjects as: general administration, engineering, sales, manufacturing, budget control, financial management, estimating, industrial re-

lations, pricing, and service department operation.

There's nothing haphazard about the program's operation. We don't invite a top management representative, then throw questions at him at random.

One man from our group is delegated responsibility for each monthly meeting. It's his job to arrange for a speaker, and for a place to hold the session.

He also circulates among other members of the group and obtains one question from each man. He then consolidates these questions, usually comes up with about five final inquiries, then distributes copies of his final set among the group as well as to the management man involved.

In this way the last-named becomes acquainted with what the group is generally thinking about and may forearm himself somewhat for the meeting. It should be pointed out, however, that while usually the set of questions is closely followed there have been times when the exact opposite has been the case.

It is also the contact assignee's job to thoroughly brief the speaker for whom he has arranged on the objectives of our group; to obtain the man's biographical résumé; and to caution him that open discussion, not a lecture, is preferred.

Because of our determination to keep our meetings on a pure discussion basis, we have never allowed our group to exceed eight members, which total was reached during the second year of its existence.

Actually we expanded it from five to eight members only for the sake of obtaining a broader scope of interests—to maintain a better balance between the various departments it represents than was possible with only five members.

SINCE our group was formed we have held discussions with about 25 management veterans. Before our current season is ended we will go outside the Toledo plant, bringing in speakers from the other nine Dana domestic divisions.

One of the finer things about our program is that it has given us younger men a good, broad picture of Dana Corporation, whereas without it, during the same span of time, we could have only become a little more familiar with our own particular departments.

For my own part, being in the Sales Department and out representing the company, it has aided me greatly in understanding the problems and limitations of other departments—of how each affects the other, and vice versa. Other members have told me it has similarly benefitted them.

A second, similar group is being formed this year, and others may follow as the program expands. The new groups will undoubtedly find that a limited membership is necessary so the informality so necessary to success can be maintained.

We're sure our program is making an outstanding contribution to both the younger men and top management. Its total advantages to the group may at times seem slow in coming—there is so much ground to be covered—but we know it will have a profound effect on all of us during the next ten years.

In that respect it might well be likened to a general education, supplying a broad store of important information on which we can profitably draw during the entire remainder of our working lives.—***End.***

About the Author . . .

Ren McPherson, the author of this article, joined the Dana Corporation as a sales engineer in 1952. He is a graduate of the Case Institute of Technology from which he received a B.S. in Industrial Engineering, and he holds a master's degree from Harvard University's Graduate School of Business Administration.

Mr. McPherson, who is 30 years old, has also served in the United States Air Force, and had achieved the rank of first lieutenant at the time of his return to civilian life.

Mr. McPherson

At Press Time Annual Meet Set to Begin

As the June issue of the AMERICAN ENGINEER goes to press, engineers from all over the country are converging on Philadelphia for the NSPE Annual Meeting at the Bellevue-Stratford, June 2-4. Among the highlights of the meeting will be: the day-long conference on "Professional Development—The Responsibility of Industry and the Engineer"; the presentation of the NSPE Award for 1955 to Dr. A. A. Potter, dean emeritus of engineering at Purdue University (see page 21); the installation of the new national officers, headed by president-elect Allison C. Neff, who will take over the NSPE administration on July 1; an address by the well-known lecturer, Cameron Ralston; and the presentation of the awards in the NSPE membership contest.

The advance registration for the Engineer-Industry Conference, which is scheduled for June 2, indicates that the event will be well attended by both NSPE members and industrial representatives. Representative Carroll D. Kearns of Pennsylvania, a member of the House Committee on Education and Labor, will be the featured speaker at the luncheon between the morning and afternoon sessions of the conference.

His address has been entitled "The Privilege of a Profession." Advance information on the speech indicates that Congressman Kearns will urge engineers to take the full responsibility for the earning and the maintenance of their own professional status, and he will also challenge both engineers and management to seek and to establish sound principles to govern their relationship so that discord and controversy will be eliminated. It is also expected that Mr. Kearns will discuss questions occasioned by the Taft-Hartley Act and possible amendatory legislation. He will be introduced as the luncheon speaker by Representative Hugh Scott, also of Pennsylvania.

Reports by the various national committees have also been prepared for presentation to the NSPE board of directors during the meeting. Among the items to be considered are questions of ethical practices, the use of advertising by engineers, the promotion of educational activities, progress on the NSPE headquarters building, chapter activities, legislative matters affecting P.E.'s, maintenance of professional status, inter-professional relations, public relations, and publications of the Society. A full account of action taken by the directors with reference to these and other items will

(Please turn the page)

Meeting

(*Continued from page 23*)

be carried in the July AMERICAN ENGINEER.

Another feature of the three-day convention will be the presentation of the awards in the NSPE membership contest. The State Societies which will be cited for their efforts are those in Nevada, Nebraska, Kansas, Wisconsin, and Missouri.

Outgoing President Clarence T. Shoch will preside over the major sessions of the meeting. Past President T. Carr Forrest, Jr., will inaugurate the NSPE Award ceremony by presenting Dean Potter to President Shoch for the bestowal of the plaque citing him for his service to the profession and to the Nation during the annual banquet.

During the banquet also, outgoing Pennsylvania SPE President Robert Miller will introduce C. L. Kreidler, president-elect, of the State Society to the assembled guests. The PSPE Annual Meeting is being held in conjunction with the NSPE meeting, with Philadelphia Chapter members acting as hosts.

The Philadelphia P.E.'s have also been in charge of arranging the engineering exhibits in conjunction with the Annual Meeting, and the press-time report from H. H. Sheppard, chairman of the Exhibits Committee, indicates that all available space has been subscribed.

In addition, to the exhibitors listed in the May AMERICAN ENGINEER, the following firms will be included:

Brick and Tile Corporation
Connery Construction Company

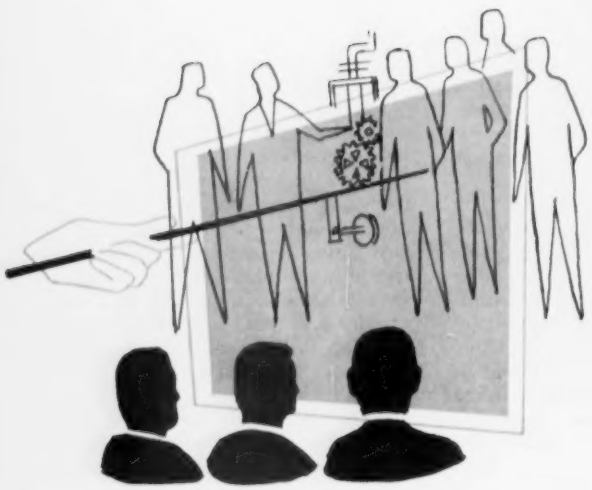
The Electrical Association of Philadelphia

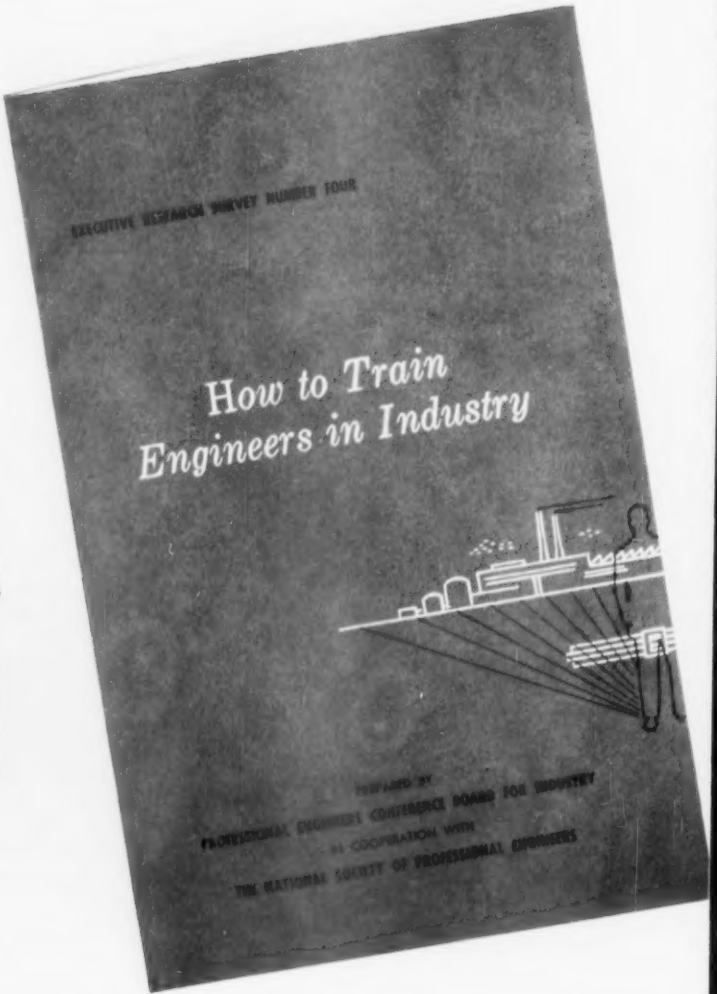
Tide Water Associated Oil Company

Wright Hoist Division, American Chain and Cable Co., Inc.

Does your Firm Really Trai

● Here is the fourth in a series of valuable studies designed to aid in the improvement of relations between management and its engineer employees, and to increase the efficiency of engineer utilization in industry. This report is the result of an extensive research project involving over 200 industrial employers of professional engineers.





Tennessee and West Virginia Strengthen Registration Acts

The engineering and architectural registration law in Tennessee, and the engineering law in West Virginia have been strengthened by recent action of the respective legislatures. In both cases the changes require eight years of engineering experience, of which not more than four years may be credited for satisfactory completion of study at an approved school.

Under the former laws Tennessee did not require any practical experience and West Virginia required three years of experience, in addition to the four years of educational credit.

The Tennessee action culminated several years of intensive effort by the Tennessee Society of Professional Engineers, with the support of the Tennessee Registration Board. Tennessee has a joint engineering-architectural law and board and the amendment was supported by the Tennessee Society of Architects. The engineering and architectural societies pointed out, in supporting the revision, that it would bring Tennessee into line with the requirements of most other states and would facilitate the reciprocal registration of Tennessee engineers and architects in the other jurisdictions.

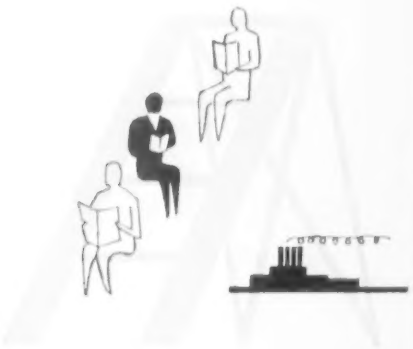
Teaching Jobs Open

The Department of Electrical Engineering, Newark College of Engineering, has announced that it will have openings for an instructor of electrical engineering and an assistant instructor in the same field in the term beginning in September, 1955.

Candidates for the first post should have an M.S.E.E. degree and two years of teaching or industrial experience. Applicants for the assistant instructor position are required to have a B.S.E.E. degree.

...ain Its Engineers ?

American industry is rapidly becoming a post-graduate school for engineer training. Do you have the facts about this vital industrial development? If you are an engineer employed in industry or an engineering executive you owe it to your firm and to your own professional career to become acquainted with the dynamic engineer training programs that are standard on today's fast moving industrial scene.



THIS STUDY GIVES THE FACTS . . .

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Written in crisp, specific language, "How to Train Engineers in Industry" will show you how your own firm shapes up in the industrial training picture, while giving you detailed "how to do it" information. It has already proved an "eye opener" for training directors who thought they knew all the answers. Add this important study to your professional bookshelves.

The special price to NSPE members is $1.00, just one-half the regular cost. Here are facts and figures at your fingertips. Actual training charts and rating forms are reproduced for comparison with those used by your firm.

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A+ for ACHIEVEMENT

Do Outstanding Engineering Students Keep on Going Places After They Leave College?

How Do They Prove the Professors Were Correct in Giving Them Top Scholastic Ratings?

PROFESSOR Harold E. Babbitt, until his retirement a professor of sanitary engineering at the University of Illinois, is this month's contributor to the new AMERICAN ENGINEER series on outstanding engineering students who have gone on to even greater accomplishments since graduation. He is "embarrassed with riches," he tells us because he has taught a "constellation of stars" during his many years at Illinois, and it is impossible to select just one student as THE outstanding one when so many have been so brilliant.

As an excellent representative of the many fine students he has taught, however, Professor Babbitt awards his "A-Plus" for Achievement to:

William H. Wisely, P.E.
Searsdale, N. Y.

Professor Babbitt Comments:

"William H. Wisely was graduated in Civil Engineering, Sanitary Engineering option, at the University of Illinois in the Class of '28 with what we call the famous 'Sanitary Six,' all of whom are now leading citizens. 'Pete,' as he is known to his friends, had demonstrated his abilities through high character, perseverance, industry, and skill. Because of financial considerations he had to be a hard worker outside of school, too, and at that time held, and possibly still holds, a union card as a carpenter. His popularity with his classmates was easily recognized.

"His first job after graduation was with the Illinois State Department of Health. Next his energy, ability, and ambition took him to the job of engineer-manager of the Urbana-Champaign Sanitary District where he served for two years.

"At the death of G. H. Radebaugh, secretary of the Central States Sewage Works Association of which I was then president, Pete was appointed to serve in his place, and here he showed his ability to coordinate, manage, and execute Society affairs so clearly that he attracted the attention of the National Board and was appointed executive secretary of the Federation of Sewage Works Associations (now Federation of Sewage and Industrial Wastes Associations) and editor of its Journal.

"His latest step up the ladder of accomplishment has been his acceptance of the position of executive secretary of the American Society of Civil Engineers. To take this new post in New York City, he has left Champaign, Illinois, where he has truly been a 'VIP,' with both the regrets and good wishes of friends.

"Pete has always been active professionally and more than generous with his time for friends, for the community, and for the profession. He first joined the Illinois Society of Professional Engineers as a student member in 1928, and he later became a member of NSPE. He has served on many of the Illinois SPE committees, on the State Board of Directors, and he was president of the Capital Chapter in 1940.

"I am very glad to have the opportunity to turn your spotlight on this outstanding professional engineer—William H. Wisely."

H. E. Babbitt

(Second of a Series)

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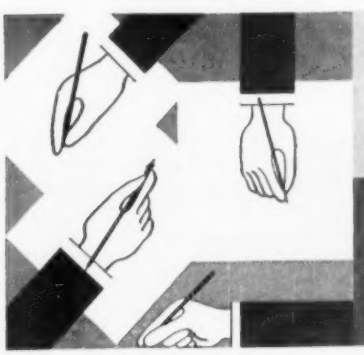

Professional POSTSCRIPTS

Recently the Alabama SPE sponsored an essay contest open to college engineering students in that state. This worthwhile project brought forth many fine entries from the students who told why they had selected engineering as a career. Only two could win, however, and we are happy to present the efforts of these engineers-to-be on these pages. Our thanks, then, to the Alabama SPE, and to Clayton D. Pruett, a sophomore in civil engineering at Alabama Polytechnic Institute, whose piece appears first, and to Edwin M. Hardin of the University of Alabama, the final author.

—PP—

The profession of engineering is manifest on all sides wherever we go in this world today. In fact the comforts and conveniences that we have all come to accept, such as our vast transportation facilities, our modern housing and sanitary facilities, our great electrical systems and our communications facilities, to mention a few, are all the work of the engineer. The work of the engineer is just as obvious to me as the order and beauty of Nature.

When the time came for me to choose the profession for which I wished to train I looked about me. One profession stood out from the rest as offering the most opportunity to me. No other profession could outshine engineering in my eyes. It fitted me and my philosophy. For me the choice was an engineering career. Why?

Engineering is a practical profession, and like the doctors, lawyers, educators, clergy and other professionals, the engineer performs a vital service to mankind. The engineer's great task is to satisfy human needs. Monetarily speaking, engineers are not the richest people in the world, but, can we measure riches in dollars and cents? This question has been convincingly answered long ago by men who were vastly more qualified than a college student and the unanimous answer is No. The wealth in engineering comes in service to your fellow men, your community and your government. It is not too much to ask for a salary sufficient to meet the cost of a reasonable standard of living. The engineering profession pays such salaries.

Engineering is a highly individualistic profession. Every day and every job is new and different. Problems come up that haven't been solved before; structures that haven't been built before; machines that haven't been designed before; projects that haven't been financed before. Maybe some situation similar to the pending one has occured before but it is not exactly like it and it never will be. The individual engineer must use his training and experiences to cope with any changing situation.

The ethics of the engineering profession are of the same basis as the life that I would like to lead. They are Christian in their whole philosophy. The opportunity of living in and contributing to such a noble profession as engineering is a matter that can not be discounted. Every engineer takes advantage of this opportunity, either consciously or unconsciously, whenever he performs his engineering tasks whether they be large or small.

Parental influence can not be overlooked because someone is always going to say that I chose engineering because my father is an engineer. No doubt the acquaintance that one gets when he grows up around a thing is an influence but I don't think that is the answer in my case. By being close to engineering I was able to see that engineering as a profession could offer me more than it offered my father's generation; and with a good education and the necessary experience, it is not inconceivable that I might give the engineering profession more than my father has.

There is no complex reasoning behind my choice of engineering as a profession. Engineering is practical; it has wealth, both tangible and intangible; it is individualistic; there is an opportunity of contributing to a noble profession, and last but not least, I have had a lifelong acquaintance with the engineering profession.

The future will tell the wisdom of my choice for it has been said that the great reward of the engineer is in himself.

Engineering is my chosen profession; it is myself.

CLAYTON D. PRUETT

Michigan Society of Professional Engineers — Annual Meeting, June 9-11, 1955, Gratiot Inn, Port Huron, Michigan.

Georgia Society of Professional Engineers—Summer Meeting, June 17, 18, 1955, General Oglethorpe Hotel, Savannah, Georgia.

South Carolina Society of Professional Engineers — Annual Meeting, June 24, 1955, Wade Hampton Hotel, Columbia, S. C.

Nevada Society of Professional Engineers—Annual Meeting, June 25, 1955, Reno, Nevada.

West Virginia Society of Professional Engineers—Annual Meeting, September 22-24, 1955, Fairmont Hotel, Fairmont, W. Va.

NSPE Fall Meeting — October 14-15, 1955, Peabody Hotel, Memphis, Tenn.

Why did I decide to become an engineer? This question cannot be answered with a word or a single sentence inasmuch as the decision was influenced by many factors. Every individual, consciously or subconsciously, has some criteria by which he may judge the fields of endeavor available to him and selects his life's work as a result of this judgement. In order to provide an accurate and complete understanding of my decision, each of the pertinent factors must be enumerated and analyzed to determine to what extent each contributed to the final choice.

Unquestionably, the principal reason as to why I chose engineering was the result of my experience during World War II. I was assigned to a combat engineer battalion as a demolition specialist and, as such, my main function was to tear down and destroy any obstruction, man-made or natural, which halted or slowed down the advance of our troops. Following the cessation of hostilities, the unit to which I was assigned moved into Japan as a part of the occupation forces and I was detailed the task of destroying all Japanese ordnance and

(Continued on page 28)

- - - NEW PROCESSES - - -

Neoprene-nylon Giant Pneumatic Bubbles Simplify Building

Giant pneumatic bubbles, around which are being built radically different types of construction, are currently being produced by The Garrett Corporation's Air Cruisers Division, Belmar, New Jersey.

This technique — "The Bubble Building" — is being used to build

Pictured above is the "Bubble Building" form. Made of neoprene-nylon, when inflated, it is covered with concrete. After concrete hardens, the form is deflated and ready for re-use.

low-cost houses, storage plants, ammunition magazines, gas stations, and even motel units.

The new procedure first involves inflating one of Air Cruisers' immense rubberized balloons or "bubbles" which resemble an enormous soup bowl turned upside-down. The air-filled form, made of neoprene-nylon, is then sprayed on its outside surface with shot-crete, a mixture of sand, cement and water, by a compressed-air gun. Resulting concrete is extremely sturdy and coats of one-inch thickness are applied consecutively until a final three or four-inch wall is developed. When the concrete form hardens and becomes self sufficient, Air Cruisers' air-supported bubble is deflated, removed from the structure, and ready for use again.

The improved shape and utility of the modern type "bubble building" and the air form which shapes it are distinct innovations for this kind of construction, Air Cruisers points out, even though this basic method of building has been tried previously. The new shape makes the verticals of the sides higher, and the roof flatter.

According to Air Cruisers Company, the new forms have been proven for durability and ruggedness.

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For equipment operating under extremely high temperature and corrosive service conditions, The M. W. Kellogg Company, a subsidiary of Pullman Incorporated, introduces the KEL-F Plastic Dispersions — chemically inert, high temperature-resistant materials which may be applied by spraying, dipping or spreading to a broad variety of metallic and non-metallic surfaces.

The application of these KEL-F Dispersions results in a tough, adherent, continuous coating with all the important properties of the original plastic: high resistance to temperatures approaching 400 deg. F. and low temperature flexibility; excellent resistance to chemicals, including alkalies, mineral acids, strong oxidizing acids, solvents; low permeability to moisture, organic and inorganic liquids and vapors; high abrasion resistance and tensile strength; low cold flow and high impact resistance; high dielectric strength and electrical resistivity; and non-toxic and non-sticking characteristics.

KEL-F Dispersions consist of finely divided particles, 1-20 microns, of KEL-F Plastic suspended in volatile organic liquids to permit the rapid spray application of non-sagging, non-running, smooth, wet films which fuse to a film thickness of approximately 2-2.5 mils.

The coating thickness obtainable with these KEL-F Dispersions is dependent on the application. For corrosion control, usual practice recommends a minimum thickness of 10 mils built up in four-five successive coats. For extremely severe corrosion problems, however, coatings are occasionally built-up in thicknesses of 15-20 mils. For release or anti-sticking applications, a 4-6 mil film is usually employed.

Most metals including steel, stainless steel, aluminum, nickel, silver, cadmium, and lead-tin alloy plated copper, can be coated satisfactorily with dispersions based on KEL-F Plastic. Metal surface pre-treatment prior to coating application follows generally employed practices, including the uniform roughening of the surfaces with abrasive grit.

Keep informed with "New Literature"

Postscripts

(Continued from page 27)

explosives in our area. Upon the completion of this job, I was designated a construction foreman and assisted the company commander in coordinating the work of Japanese contractors in the construction of camps for three regimental combat teams. This sudden contrast between destruction and construction had a very definite effect upon me and that effect is largely responsible for my presence at this university today. I became aware of a great personal satisfaction in the work that I was doing—I would watch the buildings going up and know that, in my small way, I had helped in their construction. During the war, I had only the solace that the destruction I was taking part in was necessary for the protection of our way of life; now not only did I know the work was necessary but I also had the satisfaction of adding to, rather than taking from, life.

Very much akin to the above reason is the desire to leave some lasting impression upon the world which is inherent in almost every person. This desire can be satisfied through my work as a civil engineer in the construction of roads, buildings, and allied structures. Through this medium, I also shall be enabled to assist in the advancement of civilization by the development of cheaper and more efficient methods of construction.

As a result of the continuing trend toward specialization, the engineer has become the keystone in modern industry and, as such, is in great demand. This demand permits each engineer to advance to the limits of his own capabilities. I must admit that the preceding statement can truthfully be applied to almost every profession today, but only in engineering are the opportunities open to such a great number. The knowledge of this fact heightened my desire to enter the field of engineering. In addition, being aware of the fact that my future advancement will be restricted only by my own limitations, I have been given an incentive to apply myself to my studies in an effort to be equipped as fully as possible to meet the challenge that lies ahead.

In arriving at my decision to study civil engineering, I asked myself if I possessed the necessary talents for the task, so I listed my native abilities as opposed to those required of a capable engineer and found that with a little added effort on my part, I may be able to qualify. Coupled with this evaluation is the profound belief that I

(Continued on page 30)

book looks

The Book: **The Dynamics of Industrial Management**

The Author: Raymond Villers

The Publisher: Funk and Wagnalls, 153 East 24th St., New York 10, N. Y.

Price: $6.25

Reviewing the Book: George Metz, P. E., Division Engineer with Consolidated Edison Company of New York

THIS book presents a timely contribution for the particular edification of executives in the many small American enterprises which mushroomed during the era of wartime markets and which now find themselves perplexed with uncertainties as to the road to follow during a period characterized by markets of less spectacular potential.

A new awareness of the importance of budgeting, cost analysis and control, inventory and production programs and other concepts of scientific management begins to demand the attention of all responsible managers.

Entire organizations find it necessary to become acutely aware of the tie between cost consciousness and the potential future orders needed to keep the business thriving.

Really drastic revisions in methods and policies may be called for rather than minor adjusting.

For managers and others wishing to make a thorough check upon the present state of scientific management techniques, this book together with Professor Villers' previous volumes, "The Economics of Industrial Management" and "Budgeting Control," both written with the late Professor Rautenstrauch of Columbia will serve as a valuable reference library.

The present book presents an orderly method of surveying an enterprise and evaluating it against standards of operating procedures and organizational structure.

Procedures for effecting reorganizations and improvements in communication are presented.

There are excellent introductory chapters briefing the history of the scientific management movement and the development of the multiunit organization which has followed in the train of recent tendencies toward greater concentration in industry.

The philosophy of decentralization in management is examined and the problems of several model companies of various sizes are considered.

Those who have worked with Professor Villers know of his great concern for achieving in American industry a flexible yet stable relationship between decentralization in authority and responsibility functions, carried out coincident with a tighter system of cost and quality controls, and a greater attention to the function of planning for plant operations, improvements, diversification of products and the like.

Many engineers will agree with the author and other writers that both short term and long term planning for even the largest enterprises is frequently handled informally as a part time or spare time occupation for otherwise busy operating officials.

Professor Villers advises the formation of an independent planning and control department headed by a top management personality, preferably we assume, a well trained and seasoned engineer.

Such a department would not only plan and control every day short term consideration such as inventory control, process, and manpower utilization, but should be deeply involved in long term matters of organizational development in both men and machines. Public relations, sales and advertising policy would also come before the planning department for policy review.

A challenge is seen here in respect to the professional engineer and his qualification to act in the capacity of a top level planning official. Too frequently, this writer fears, the engineer sees in policy planning merely another opportunity to apply the compound interest formula against the problem of acquiring more efficient material assets.

If the professional engineer is to move to the forefront of management in promotional competitive enterprises he must prepare himself to operate on a broader plane of activity involving not only his familiar technology but new insight into human motives, present day value judgments, and the irrationalities to be expected of the human family.

The "Dynamics of Industrial Management" will aid the professional engineer reader in understanding the need for this wider goal and suggest methods which should prove valuable in attaining it.

Meet the Reviewer . . .

Mr. Metz

George Metz, a member of both the Queens and New York Chapters of the New York State Society of Professional Engineers and of NSPE, is a division engineer with the Consolidated Edison Company of New York. He is well qualified to review a book on industrial management as his special interest and field of study for many years has been, as he reports, "the growing significance of the role of professional engineers as coordinators and arbitrators between management and the worker, particularly from the point of view of the human relations problems involved."

Mr. Metz received his B.S. degree from the Polytechnic Institute of Brooklyn and his M.S. from Stevens Institute of Technology. He is a member of Tau Beta Pi and a former instructor in economics at the Brooklyn school.

NEXT MONTH . . .

The July issue of the AMERICAN ENGINEER will be a big one, particularly from the standpoint of National Society activities and accomplishments. Don't miss reading it from cover to cover because:

- You will meet the new national officers and learn President Allison C. Neff's plans for developing Society activities and continuing NSPE professional leadership during the 1955-56 administrative year.
- You will find full and complete coverage of the NSPE Annual Meeting in Philadelphia, which takes place early this month and from which important professional decisions will emerge.
- And there will be other items of importance written by leading authors especially for YOUR magazine.

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Professional Postscripts

(*Continued from page* 28)

shall enjoy my work and shall be able to apply myself wholeheartedly to each assigned task.

In brief, I am studying engineering because I feel that this profession offers me those things which I consider most important. In civil engineering I expect to experience great personal satisfaction in my daily work and, by maintaining the high standards of the profession, be able to take pride in the part that I shall have in developing the available resources for the benefit of my fellow man.—***End.***

EDWIN M. HARDIN

Einstein

(*Continued from page* 15)

tyranny, but explained that he feared wars even more. (At one point immediately after World War II, incidentally, his devotion to the world government ideal occasioned a stormy, if unusual and out-of-character defense of the sovereignty and independence of nations by four leading Soviet scientists. A world super-state, they wrote, would merely be a screen for "imperialist expansion.")

AT TIMES even he did not visualize how far and how fast the development of science would carry mankind. In the thirties, for instance, he advocated the teaching of pacifism in the United States schools since this country, he said, was quite free from the danger of outside attack. As noted previously, however, the greatest concern of his last years was a worry that man would impulsively set off the technological spark of his own destruction.

Einstein also worried about the question of technological unemployment and about what he considered a military intrusion into science so that in military planning the individual became merely "human materiel." Yet when he wrote, "Perfections of means and confusions of goals seen—in my opinion—to characterize our age," he was quick to add that if we want to achieve the full development of our resources, we can surely accomplish this with work and dedication.

In many ways he fulfilled the definition of the true professional man in that he was concerned with science not only in its most narrow and restricted sense, but also in the way in which it might be made a tool to serve humanity through the beneficial applications of its fundamental principles. There is really nothing more conclusive than this to use as the measure of the man who made the last fifty years the Einstein Era.—***End.***

N.S.P.E.

Believes

SURVEYS— HOW WE USE THEM

BY PAUL H. ROBBINS, P.E.

Executive Director

N.S.P.E.

At times, engineers, as many other Americans, undoubtedly feel that they are continuously being harassed with questionnaires, information from which will serve as the basis of a survey. As experience has shown the validity of the sampling process of surveys, more and more groups have tended to determine information and attitudes by this means.

The more an organization, such as NSPE, delves into the professional problems, the more important it is that as much information as possible be accumulated on the subject in order that the most valid interpretations and decisions may be made. Surveys provide a very important source of information and, if care is taken to request the information succinctly and to limit the study to a small area, they do not become burdensome and in their cumulative information become extremely helpful in rational evaluation of some of the problems facing the profession. Thus it is that NSPE believes the survey technique can be utilized to increase the store of knowledge for professional betterment.

Of course, there are several dangers which should be recognized in survey reports. It must always be remembered that a survey is merely a recording of the information received from those surveyed. Results must always be interpreted in the light of the background of the group surveyed, the questions asked, and the tabulation of replies resulting. Surveys, correctly evaluated, do provide insight into the predominant thinking on particular subjects.

Surveys actually fall into three broad categories, NSPE having conducted surveys in each of them and some surveys combining several. The first is the factual survey; one which seeks to determine specific answers of a factual nature. The best example is the Salary Survey recently conducted by NSPE, now being printed and which will be available to the membership in late June. Here again it must be recognized that these facts are merely compilations and grouping into various categories of the replies of over 14,000 members of the Society. While individual figures in the survey might be argued to be in error by small percentages, the size of the sample and the averaging factors do provide interesting average statistics of the income of Professional Engineers. Since all members of the Society were surveyed both in 1952 and in 1954, the sample is comparatively the same; and the comparisons between 1952 and 1954 income undoubtly are valid. NSPE believes this type of factual survey provides needed information on the economic status of engineers.

The second broad general type of survey is the attitude survey. This is extremely important for the work of committees and the general policy-making bodies of the Society. Based, as NSPE is, on the fundamental concept that the individual engineer must determine the policies of the profession and that those policies must be in accord with the wishes of the individual engineer, it is important that all avenues of exploration be utilized to determine his wishes. An example of this type of project was the sampling survey recently conducted by the NSPE Registration Committee. The purpose of this survey was primarily to determine the opinion of the average engineer on a number of questions with respect to the administration and requirements of registration. While a full analysis of this questionnaire has not yet been completed, much information has been secured which will be of assistance, not only to the National Society's Registration Committee but also to Registration Boards and the State Societies, as the continual problem of revision and administration of registration laws is faced.

The third broad grouping is the compilation of existing information. NSPE's recent publication, "A Professional Look at the Engineer in Industry," is an example of this type of survey which has accumulated the latest and most complete information on the problem of professional relations of the engineer in industry.

Of course, there are surveys which tend to combine several of these types of information. The Executive Research Survey Series of the Professional Engineers Conference Board for Industry is an example where not only the factual information on practices affecting the relationships of engineers and management has been secured, but the attitudes on the effectiveness and desirability of some of these activities also have been tabulated.

NSPE believes that the professional society not only serves its members but serves the profession and the national welfare by the accumulation of information of this kind. Believing as we do that the hallmark of a profession is its service to society, it is only as we are well informed not only on matters pertaining to the engineering profession, but its relationship to government, to industry, to those who have need of engineering services, that the professional society — and through it, the profession itself—can most adequately serve the public welfare.—*End.*

(and if Certificate No. 1 is desired)

Chapter

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With Our Members . . .

New York Convention

Members Hear Outstanding Speakers; See Exhibits; Bestow Awards

Members of the New York State SPE met at the Commodore Hotel in New York City, May 12-14, for the Society's 29th annual convention.

Officially welcomed by Mayor Robert F. Wagner, the P.E.'s heard lectures by a number of outstanding figures including Bertram D. Tallamy, chairman of the State Thruway Authority, NSPE President Clarence T. Shoch, and Dr. Thorndike Saville, dean of the College of Engineering, New York University. Also, a conference workshop on "The Strategy of Success" featured Jerome Mayer, consulting phychologist of Cornell University, as the principal speaker; and another conference on "Planning Boards Helped by Engineers" included addresses by James N. DeSerio, a consulting engineer, and Dr. George B. Robinson, director of Planning, New York State Department of Commerce.

Mr. Tallamy was also the recipient of the NYSSPE's annual award, and the Society's annual citation for professional eminence was presented to Charles Ridel, former chief of the Board of Estimates. A special scroll inscribed to the memory of the late Dr. Arthur V. Sheridan was presented to his son, Arthur V. Sheridan, Jr., in the name of the Society.

One of the main attractions of the 1955 Engineering Industries Exposition held in conjunction with the convention was the complete model of an atomic plant for the production of electric power. This exhibit was provided by the General Electric Company.

Officers of the NYSSPE presided at the various conference sessions, and other prominent members participated in the presentation ceremonies. Samuel Carr was general chairman. A special program was arranged for the ladies.

Nebraska P.E.'s Hold Annual Banquet

The Fontenelle Hotel in Omaha was the scene of the recent annual banquet of the Nebraska Society of Professional Engineers. President C. W. Durham acted as master of ceremonies and introduced the speaker of the evening, Garvin Dyer, manager and chief engineer of the Independence, Missouri, Water Works.

A vice president-elect of the National Society, Mr. Dyer spoke on the subject, *The Engineer's Professional Responsibilities.*

Wisconsin P.E.'s Hear Dr. Gilbreth

Members of the Western Chapter of the Wisconsin SPE and of the La Crosse affiliates of the American Society of Mechanical Engineers and the American Society of Tool Engineers held a joint dinner meeting recently at which Dr. Lillian M. Gilbreth, well known woman engineer, was the guest speaker. Dr. Gilbreth, who is Knapp visiting professor in mechanical engineering at the University of Wisconsin, discussed problems of management engineering with particular emphasis on the human factor involved.

Norman W. Moser, chairman of the ASME group, presided over the meeting, and the speaker was introduced by Professor Ben Elliott, head of the department of mechanical engineering at the University of Wisconsin and regional vice president of ASME. Both are also members of the WSPE, Mr. Moser being a director-elect of the Western Chapter.

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THEY PLANNED NEW YORK'S CONVENTION—Pictured below are the members of the two principal committees responsible for planning the successful NYSSPE annual meeting. The photograph at the left shows the General Convention Committee: seated, l. to r.—Paul Klepper, Chairman Samuel Carr, Lucien J. Cavagnet, and Nathan Feder; center row—John Lane, George T. Baer, Angelo A. Lorie, A. W. Bertram, Frank P. Padron, Harold Funk, Clifford C. Blanchard, and Luther R. Hill; back row—Saul Geller, John W. Heiss, and Harold Becher. Other members, not pictured, were H. Carl Bauman, Marie Reith, Emanuel Lindheimer, and Rolf H. Seibert.

Members of the Ladies' Program Committee are shown in the photo at the right. Seated, l. to r., are: Mrs. John E. Lane, Mrs. Paul Klepper, Mrs. George T. Baer, Mrs. John J. Costa, and Mrs. Leslie Wax. Standing are: Mrs. Luther R. Hill, Mrs. Herbert F. Roemmele, Miss Lillian M. Lawrie of the headquarters staff, Mrs. C. W. Valentine, Mrs. Saul Geller, and Mrs. Harold Becher.

New Jersey Meeting Is Outstanding Event

"Engineering—Today's Progress; Tomorrow's Promise" was the theme that keynoted the 31st annual convention and exhibition of the New Jersey SPE. Held at the Hotel Essex House in Newark late in April, the meeting was reported to be one of the most outstanding in the State Society's history.

Among the prominent speakers who took part in the two-day program were: Leo P. Carlin, Mayor of Newark; John Flockhart, city business administrator; Dr. Ralph C. Hutchison, president, Lafayette College; Hon. Carroll D. Kearns, U. S. Representative from Pennsylvania, and John H. Morris, Sr., of the Bureau of Public Health Engineering.

Morris D. Hooven, AIEE president-elect, and Alfred G. Vollmar of Roy M. Henwood Associates, took part in a symposium on the theme of professional status; Alonzo L. Jones served as chairman. Another symposium on the subject of the New Jersey water supply was presided over by Harold M. Ohland, with Charles H. Capen, chief engineer, N. J. District Water Supply Commission, and Meredith Johnson, chief geologist, N. J. Department of Conservation and Economic Development, participating.

The New Jersey Society's annual engineering award was presented to Othmar H. Ammann during the meeting, while George E. Stringfellow received the citizenship award.

Charles Stillman is president of the NJSPE. James F. Kelly served as general chairman for the meeting.

J. H. McElhinney Dies

Word has been received of the death of John H. McElhinney, a charter member of the Wheeling Chapter of the West Virginia Society of Professional Engineers. Mr. McElhinney, who was vice president in charge of operations for the Wheeling Steel Corporation, died unexpectedly during an April vacation in Florida.

A native of Burlington, Iowa, and a graduate of the University of Pittsburgh, he was nationally known for his achievements in the steel industry. He was a past president of the American Standards Association and of the West Virginia Manufacturers Association, in addition to having held various offices in the Wheeling Chapter of the WVSPE.

South Piedmont Chapter Officials

Officers and directors of the South Piedmont Chapter of the Professional Engineers of North Carolina are shown above as they looked over program plans prior to a recent dinner meeting in Charlotte. Seated, left to right, are: Guy J. Fisher, second vice president; James Hunter, president; and L. A. Coone, first vice president. Standing are: George Moore, director; Ben Swain, secretary-treasurer; and James T. Meador, director. All are residents of Charlotte, except Mr. Fisher who comes from Concord and Mr. Moore who lives in Albemarle.

Cleveland SPE Sponsors Certificate Presentation

Seventy-eight Ohioans who have recently passed the examinations of the Ohio State Board of Registration received their registration certificates at ceremonies sponsored by the Cleveland SPE on May 19 in the Cleveland Engineering Society Auditorium.

The Hon. Parker Fulton, judge of the Cuyhoga County Common Pleas Court, administered the professional engineers' oath. Walter Graff, a member of the State Registration Board, presented the certificates, while Homer T. Borton, president of the Cleveland SPE and of The Osborn Engineering Company, presided.

Daniel J. Martin Speaks In Cambridge

Dr. Daniel J. Martin, a well-known NSPE member and a past president of the San Jacinto Chapter of the Texas Society, was invited to Massachusetts recently to give the Sauver Memorial Lecture under the sponsorship of the Boston Chapter of the American Society for Metals. His address, which was entitled *Metallurgical Problems* in Oil Well Drilling, was delivered at the Massachusetts Institute of Technology Faculty Club in Cambridge.

Dr. Martin is vice president for engineering and director of research and engineering for the Hughes Tool Company, Houston, Texas.

Bucktail Chapter Sees Color TV Demonstration

Members of the Bucktail Chapter of the Pennsylvania SPE were entertained by a color television demonstration at a recent meeting held at the Sylvania Club in Emporium, Pa. The demonstration was supplemented by a lecture by James S. Allen, an engineer with Sylvania Electric Products, Inc. A tour of Sylvania's Radio Tube Division plant in Emporium was another feature of the program that was concluded with a dinner for members and their guests.

The Bucktail Chapter has also announced the recent election of officers. They are: Robert M. Hulings, president; Edward Lee Van Sickel, vice president; Myles J. Sallack, secretary-treasurer; Eugene F. Golla, state director; and LeRoy Conn, C. K. Gifford, Sr., and Carl V. Lovell, chapter directors.

. . . more news on page 35

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Dr. Gustav Egloff

One of NSPE's most prominent members—Dr. Gustav Egloff—died April 30 in Chicago after a brief illness. Dr. Egloff, who was sometimes referred to as "Mister Petroleum," was one of the world's foremost petroleum engineers. He was research director of the Universal Oil Products Company of Des Plains, Ill., and held approximately 300 patents here and abroad relating to the processing of petroleum oil, coal, shale oil, and chemical derivatives of hydrocarbons. He was also well known as a technical writer and as a speaker.

A member of many technical and professional societies, he had also served on national committees of NSPE.

Engineering's Impact On Agriculture Told

Agriculture and Engineering was the subject discussed by William E. Larsen, the guest speaker at the May meeting of the Delaware Society of Professional Engineers. Mr. Larsen, an agricultural engineering graduate of the University of Nebraska, is engaged in teaching, extension, and research work at the University of Delaware.

The meeting was held in Dover, Del., at the Dinner Bell Inn.

Philadelphia Officers

Officers recently elected by the members of the Philadelphia Chapter, PSPE, for the 1955-56 term are: Frank W. A. Myers, president; Merill Blankin and George Kelso, vice presidents; George W. Kraemer, secretary; and George Cook, Jr., treasurer. Also, Ralph W. Hoch was elected alternate state director, while Victor G. Thomassen, Coleman Sellers, III, and Alfred E. Baccini were elected chapter directors.

. . . more news on page 37

AT TENNESSEE MEETING — Pictured at the right is a group of participants in the recent Annual Meeting of the Tennessee Society of Professional Engineers. Left to right are: N. W. Dougherty, dean of engineering, University of Tennessee, and past national vice president; NSPE President Clarence T. Shoch; the Hon. John W. Wimberly, Mayor of Kingsport, where the meeting was held; Armour T. Granger, newly-installed president of the TSPE; and A. Carter Crymble, outgoing president of the State Society.

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Kings County Installs Officers

New officers for the Kings County Chapter of the NYSSPE were installed during a May 26th meeting at the Brooklyn Engineers Club, presided over by outgoing President Arthur A. Vioni. Herbert F. Roemmele, dean of students at the Cooper Union Institute, acted as installing officer.

The new chapter leaders are: H. Carl Bauman, president; Harold Becher, first vice president; William Spivak, second vice president; Paul Klepper, treasurer; Irving J. Lake, secretary and historian; and Joseph Epstein, Joseph Lewin, Joseph Mistretta, Martin J. O'Reilly, Harold Weeks, and Meyer Wiles, directors elected to serve until 1957.

Shoch Addresses D. C. Banquet

NSPE President Clarence T. Shoch was the honored guest and featured speaker at the Annual Banquet of the District of Columbia Society of Professional Engineers. The May 21st event was held at the Cosmos Club in Washington. The banquet was preceded by the presentation of a brief report on society activities for the 1954-55 administrative year by President Walter H. McCartha.

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Salary Survey Data To Be Released Soon by NSPE

Announcement has been made at National Headquarters that the results of the new NSPE Income and Salary Survey have now been tabulated and analyzed, and the full report will soon be released. The statistics cover the earnings of the NSPE participants for the calendar year 1954, and wherever possible a comparative analysis is being made with the figures resulting from the earlier survey of 1952

P.E. income also sponsored by the National Society.

One significant result that has already become apparent is the fact that the median income has risen for engineers in all sections of the United States. The earlier survey divided the country into six regions for purposes of study and analysis, and the same division is being observed in tabulating the new data.

The greatest increase in the median occurred in Region 4, which includes the states of Montana, Wyoming, North Dakota, South Dakota, Nebraska, Kansas, Minnesota, Iowa, and Missouri. There the jump was from a median of $6,810 in 1952 to a figure of $7,630 in 1954, or an increase of 12 per cent.

The highest median income figure, as before, was in Region 1, which includes the New England and Middle Atlantic States. There the new figure —$9,310—marked a 7.9 per cent rise over the 1952 figure of $8,630. Proportionately speaking, however, there were greater increases in two other areas—the far West and the Southeast. In Region 6, the Western States, the 9.2 per cent increase brought the median income figure from $7,230 to $7,900; while in Region 2, the Southeast, there was a rise from $7,500 to $8,170, or 8.9 per cent.

In the two remaining sections—Regions 3 and 5—the increases were 6.4 and 7.7 per cent respectively. In Region 3, which includes Wisconsin, Michigan, Illinois, Indiana, Ohio, Kentucky, and West Virginia, this represents an increase from a $7,710 median to one of $8,200. In Region 5, which is comprised of Colorado, New Mexico, Texas, Oklahoma, Arkansas, and Louisiana, the increase was from $7,160 to $7,710.

Minn. SPE Reports Ruling on Bidding

The Minnesota Society of Professional Engineers reports a significant ruling by the State Attorney General which negates a local competitive bidding requirement. Attorney General Miles Lord stated in his opinion: "The services of a lawyer or a physician or of an architect or surveyor are not embraced within the provision requiring the letting of contracts to the lowest bitter. . . . It is our opinion that the provision of the charter . . . requiring that contracts for work in excess of $200 in amount be let to the lowest responsible bidder is not applicable to the retaining of a firm of engineers to make an engineering survey."

This opinion is in conformity with others which have held that local or state competitive bidding requirements in the law do not apply to professional services.

Homes for Korea

Engineers will be interested to learn of a new "Homes for Korea" project which is being sponsored by the building industry of the United States under the direction of a special committee of which General James A. Van Fleet is honorary chairman.

The program will require around $1,500,000 in materials and donations from industry. Further information is available from the Building Industry Committee, the American Korean Foundation, 270 Park Avenue, New York 17, N. Y.

STRICTLY BUSINESS

Personalities . . . **Archie J. Doolittle,** Passaic, N. J. engineer, has been named an associate in the architectural firm of **Eggers and Higgins,** New York City. . . . **Robert C. McDowell,** president of **McDowell Company, Inc.,** Cleveland, O. industrial contractors and engineers, has announced the appointments of **Harold E. Rowen** as general manager and **Patrick V. Gallagher** as chief engineer of the firm's new Dwight-Lloyd Division. The Division represents the McDowell firm's acquisition of the assets of the former **Sintering Machinery Corporation** of Netcong, N. J. . . .

Mr. Doolittle

Raymond E. Harvey has been named development engineer of the **Smith-Gates Corporation,** Plainville, Conn. . . . **Ernest M. Hall, Jr.,** has been named executive vice president of **Electro-Technical Laboratories, Inc.,** Houston, Tex. . . . **Norman J. Hoenie** has been appointed chief engineer, Machine Division, and **Emmett Smith,** chief engineer, Electrode Division, of **The Lincoln Electric Company,** Cleveland, O. . . . **John A. Wiedmann** is the new director of research and development at **A. W. Cash Company,** Decatur, Ill.

Lyman C. Gross, consulting engineer of Minneapolis, Minn., has announced that **Herbert J. Frey** is now an associate with his firm. . . . **Hilton A. Levonian** has been appointed vice president in charge of consulting engineering for **The Kuljian Corporation,** Philadelphia, according to **Arthur H. Kuljian,** vice president, engineering. . . . **Frank A. Faulkinberry** has been appointed staff chemical engineer of **The Rust Engineering Company,** Pittsburgh; he will make his headquarters in the Birmingham, Ala. office. . . . **John F. Haines** has joined **ALCO Products Inc.** (formerly **American Locomotive Company**), Schenectady, N. Y., as chief development engineer, atomic products. . . . **John J. Green** has been named service engineer in the Pittsburgh office of the **Vanadium Corporation of America.** . . . **John A. Holbrook** has been appointed assistant director, physical plant of the Presbyterian Hospital of the City of Chicago. . . . **T. P. Jones** has been named assistant manager of the Atlantic Region of **Westinghouse Electric Corporation** with headquarters in Philadelphia.

Mr. Levonian

The appointment of **Robert W. Marvin** as general manager of **Dravo Corporation's** Engineering Works Division, Pittsburgh, has been announced. . . . **T. K. Greenlee** has been appointed division engineering manager for the Grand Rapids, Mich. Division of **Lear, Inc.** . . . **C. R. Davis,** vice president—Western Region, **Robinson Aviation, Inc.,** has announced the appointment of **Donald H. Alder** as manager, Field Product Engineering, for the region. The firm's West Coast office is located in Santa Monica. . . . **Tinius Olsen II** has been elected president of the **Tinius Olsen Testing Machine Company,** Willow Grove, Pa., succeeding his father, **Thorsten Y. Olsen,** who was elevated to chairman of the board. . . . **Frank W. Glaser** has been appointed a vice president and director of the **Alloy Precision Castings Company,** Cleveland, according to **Ronald D. Gumbert,** president. Mr. Glaser will be in charge of engineering and product operations.

Reorganizations and Changes . . . **O. J. Porter & Company** and **L. C. Urquhart,** who have been associated with **Benjamin E. Beavin, Sr.,** under the firm name of **Porter, Urquhart and Beavin** have announced that their consulting engineering business is now continuing under the name of **Porter, Urquhart, McCreary and O'Brien.** The firm has offices in Newark, N. J., New York City, San Francisco, Sacramento and Los Angeles, Calif., and Fremont, O. **Bruce D. McCreary** is the partner in charge of the San Francisco and Sacramento offices, while **Kenneth H. O'Brien** serves in the same capacity in Los Angeles. **A. C. Perkins** is project engineer in Ohio. Mr. Beavin has now opened an office in Baltimore as a civil engineering consultant and will be associated with **Porter, Urquhart, McCreary and O'Brien** in some joint ventures and as a consultant on projects in Maryland and vicinity.

Godfrey Engineering, consulting firm formerly of Canonsburg, Pa., has moved its office to the Professional Building in Washington, Pa., according to **Raymond W. Godfrey,** owner and manager. . . . Shareholders of the former **American Locomotive Company,** Schenectady, N. Y., have approved a change in the name of the firm to **ALCO Products, Incorporated** to reflect the company's increasingly diversified operations.

New Firm . . . The formation of a new railroad contracting organization, **Brewster-Raymond Company, Inc.,** Cleveland, O., has been announced by **H. H. Brewster,** Cleveland railroad engineer who is president and treasurer. **John G. Raymond,** president of **Associated Products, Inc.,** Akron and Toledo, is vice president, and **Frederick H. Gillen** of the law firm, **Burroughs, Gillen & Allen,** Akron, is secretary of the new organization which will specialize in the engineering and construction of new railroad sidings and the rehabilitation of existing tracks and other facilities. A branch office is located in Akron.

Contract . . . The Commissioners of the District of Columbia have contracted with the Harrisburg, Pa. consulting firm of **Modjeski and Masters** to have plans drawn for a new Potomac River bridge. The consultants will have six months after a date set by the city to draw four different bridge plans following which the Fine Arts Commission will have 90 days to consider the designs.

Letters

(Continued from page 5)

of "How can I benefit most from my service?"

I served in the Navy in World War I as an Engineer Officer on a Navy transport, "ferry-boating" from the U. S. to France and remained in the Naval Reserve for 15 years. The engineering experience and training I received proved invaluable to me in after life. When we entered World War II, I immediately took an engineering position with the Navy, Bureau of Yards and Docks, in preference to a much better paying job in private industry. (I wouldn't have been happy anywhere else, anyhow.)

And my four sons all served or are serving their "hitch." Two of them enlisted in the Naval Reserve while they were still in high school, were recommended by their Commanding Officers as "Officer Material," took and passed the competitive examinations for entrance to the U. S. Naval Academy and graduated therefrom. Both are career officers, one is now a Commander and the other a Lt. Commander.

A third son is a veterinarian and in the Veterinary Medical Corps Reserve.

The youngest son graduated from the University of Illinois with a B.S. in Mechanical Engineering, specializing in power plants, heating, ventilating and air-conditioning. On the advice of his two brothers in the Navy and myself, he applied for and was accepted in the Naval R.O.T.C. and was commissioned an Ensign, USN, on graduation. During his summer vacations, he made two overseas cruises with the fleet and had one summer of training at a base in Virginia and at the Corpus Christi, Tex., Naval Air Base.

Immediately after graduation, he took and passed the New York State Examination for Engineer-in-Training, then went on active duty in the engineering department of a destroyer. . . .

At this writing, he has been assigned to the Destroyer Steam Engineering School at Newport, Rhode Island, and after graduation from there, will rejoin his ship as Engineer Officer (Chief Engineer) in charge of a power plant of approximately fifty thousand (50,000) horsepower, operating at 900 pounds steam pressure.

When he completes his three-year "hitch," he will have had training and experience in engineering and in handling men that he would not get in ten years anywhere in private industry ashore. Incidentally, out of about 100 men on his ship, due to be discharged this coming summer, 90 per cent of them plan to go to college under the G.I. Bill, at Uncle Sam's expense. . . .

So to me, it would seem that the smart thing for any able-bodied young man to do, instead of waiting around "on the fence" wondering whether and how he can get deferred for some reason or other, is to plan on serving his time just as he might plan on getting a job or going to college. Find out all he can about the several branches of the service, compare the opportunities in each to learn something he is interested in, then go after it.

Don't go in just with the idea of "serving out his hitch" but go in with an object in view, to learn all he can and get as much out of his service as possible. All branches of the service are looking for these kind of chaps; one has to take the bitter along with the sweet but the opportunities to learn and advance are there for those who go after them. And the lessons learned in the service stay with one all his life.

FRANK L. WADSWORTH, P. E.,
Dresden, N. Y.

U. S. Jobs . . .

Dear Editor:

I have just finished Paul Robbins' excellent article, "NSPE Senate Testimony Treats Federal Salaries" (AE, March, 1955), and I would like to add another item to the list of reasons as to why the Government has difficulty in recruiting engineers.

The various Civil Service Commissions have no set standards by which to rate an applicant. For instance, their job descriptions state that a B.S. degree is needed for a GS-5 rating, an additional year of experience for a GS-7, 2 years for a GS-9, 3 years for a GS-11 etc. yet the average applicant for a position of GS-9 or above will find his experience discounted by the Commission. I notice that Mr. Robbins states "a minimum of four years of broad and progressive professional engineering experience" is required to qualify for a GS-13 rating. I seriously doubt whether anyone with that minimum has ever been able to qualify. An applicant is much more likely to be required to have two to three times the experience listed in the job writeup to qualify for a Federal position.

As a concrete example, I would like to cite a case with which I am familiar. A metallurgical engineer with both a B.S. (1942) and an M.S. (1954) in Metallurgical Engineering from an accredited school, Registered Professional Engineer (Metallurgical) in Michigan, and over 8 years of widely diversified metallurgical and materials engineering experience applied to the Civil Service Commission in Chicago for a rating as a Materials Engineer and as a Metallurgical Engineer. With 5 veteran's preference points, he achieved a rating of 71 as a Materials Engineer GS-11 and was declared ineligible for Metallurgical Engineer GS-11 despite the fact that he has held the position of Production Metallurgist GS-11 for over 3 years and held the position of Staff Metallurgist (equivalent to GS-12) with the Studebaker-Packard Corporation for approximately a year.

When conditions such as this exist, it is easy to understand why engineers refuse to enter Federal service.

BERNARD TROCK, P. E.,
Detroit, Mich.

JUNE MEETINGS Of Note

Columbia University (Department of Industrial and Management Engineering)—Sixth Annual Conference on Industrial Research, June 6-10, Arden House, Harriman, N. Y.

Cornell University (Department of Industrial and Engineering Administration, Sibley School of Mechanical Engineering)—Industrial Engineering Seminars, June 14-17, Cornell Campus, Ithaca, N. Y.

University of California (Department of Engineering)—1955 Heat Transfer and Fluid Mechanics Institute, June 23-25, University Campus, Los Angeles, Calif. In cooperation with other schools and engineering societies.

American Society of Heating and Air-Conditioning Engineers—Semi-Annual Meeting, June 27-29, St. Francis Hotel, San Francisco, Calif.

American Institute of Electrical Engineers—Summer Meeting, June 27-July 1, Swampscott, Mass.

Potter

(*Continued from page* 21)

women who are not only masters of the subject they teach, but who have also a thorough mastery of their mother tongue, unbounded enthusiasm for people as well as learning, unlimited patience, high ethical standards, and a full appreciation of the meaning of liberty.

6. American industrial supremacy and our higher standard of living have been attributed partly to our great natural resources, more so to the fact that this great land of ours has attracted, encouraged, and developed the most creative people in the world, and even more by reason of the type of government our people have had for over 175 years—a government which has given its citizens maximum incentive to create more and to have more of the goods and comforts of life than any people in human history.

IT IS gratifying to report that there has been a rapidly growing appreciation on the part of American engineers that their professional contributions, as well as their personal and family welfare, depend very largely upon our ability to retain the American Way of Life, which is only possible by means of the American type of government. The members of our profession realize that to have good government we must interest ourselves and work for good government, and must be willing to give of our time and talents to public affairs.

7. Finally, it must be realized that the future of industry, of our profession, and in fact of our civilization is bound to depend more and more upon individuals who appreciate human values.

Our world must be built upon law, order, honor, decency, and kindness and not upon force, deceit, and sadism. We must insist that the American type of engineering education should, by encouraging good teachers, strive to develop people who have the wisdom, vision, and character to utilize science and technology for the benefit of humanity, who have a full appreciation of the true meaning of liberty, and who are guided by our Bill of Rights, which protects the individual alike from the tyranny of government and the abuse of the masses.—***End.***

...NEW LITERATURE...

To help the offering firms determine which literature you require, when requesting an item, be sure to list all specifications shown . . . and say you saw it in the AMERICAN ENGINEER.

AIR CONDITIONING—Tips on ways to apply economical and efficient air conditioning are outlined in a new Du Pont booklet. Entitled "Guideposts to Better Air Conditioning Installations," the 36-page booklet is a compilation of semi-technical articles. Separate sections are devoted to comfort cooling of living quarters, including hotels and apartment houses; public and commercial buildings. Contains suggestions on the most practical location of air conditioning equipment from a building design standpoint. Booklet A-8726 available on request to F. R. Zumbro, 6529 Nemours Bldg., Wilmington, Del.

—AE—

PRINTED CIRCUITRY — Cornell-Dubilier Electric Corp. announces the publication of "Printed Circuitry," in new eight-page illustrated booklet. Covers application, uses, and advantages of printed circuits in various electric products and equipment, plus technical information to aid in design or planning of printed circuitry. Explains different types of base materials, laminate characteristics and circuit designs. Write to: Printed Wiring Division, Cornell-Dubilier Electric Corp., South Plainfield, N. J.

—AE—

DAYLIGHTING—Wasco Products Inc., has a new folder on its complete line of prefabricated daylighting products. Includes the acrylic plastic Skydome and related units that provide daylighting plus ventilation, automatic fire and safety venting, insulation and access to the roof. "Daylighting with Wascolite Skydomes," contains 12 pages of illustrated, schematic and specification material. For free copies write: Wasco Products, Inc., 93P Fawcett Street, Cambridge 38, Mass.

POWDER METALLURGY—A 52-page treatise on Powder Metallurgy published by the Amplex Division of Chrysler Corporation, contains case histories involving the kind of information most pertinent for both actual and potential users of metal powder parts. Sections are devoted to bearings, component parts, and filters. Includes design, loads and speeds, installation, press fit, close-in, shaft clearance, wall thickness, tolerances, temperature change, lubrication, machining, hardening, magnetic properties and flow rates. Discussed and illustrated by means of charts, tables, and graphs. Compares physical properties of ferrous and non-ferrous metal powder materials and their most common usages. Hypothetical problems are outlined and solved step-by-step. Write for "Engineering Manual E-55" to Amplex division, Chrysler Corporation, Detroit 31, Michigan.

—AE—

RUBBER ROLLS—This 60-page handbook, published by Rodney Hunt Machine Co., illustrated with 34 photographs, drawings and graphs, plus four tables of data, contains complete, up-to-date information concerning every phase of roll manufacture, characteristic, application, operation, and maintenance. Line drawings and graphs illustrate many technical aspects of rubber rolls including: effect of rubber thickness on nip and distribution of pressure; effect of linear pressure on width of nip, and pressure per square inch at different points through the nip; effect of concentration of load; effect of rubber density on pressure; effects of diameter on width of nip and distribution of pressure; and effect of deflection. Available free to roll users on request to Rodney Hunt Machine Co., Orange, Mass.

SPEED DRIVES—A new bulletin, GET-2480, detailing the operation of ball piston hydraulic constant speed drives has been announced by the General Electric Company's Aeronautics and Ordnance Systems Division. Describes operating characteristics and functions of the drives, and is illustrated with line drawings and schemetic diagrams of drive operations and components. Request from General Electric Apparatus Sales Division, Schenectady 5, New York.

—AE—

WROUGHT IRON—A new eight-page, illustrated booklet, entitled "Wrought Iron for Highway Construction," has been published by the A. M. Byers Company. Contains photographs of road and bridge applications in which wrought iron pipe and plate are presently serving and discusses resistance to corrosion and fatigue. Installations pictured include electrical conduit, drainage lines, radiant heated toll booths, and snow melting systems. Shows downspouts, bridge decks and blast plates. Obtain from Advertising Department, A. M. Byers Company, Pittsburgh, Pa.

—AE—

DRAFTING EQUIPMENT—A new revised catalog, just issued by the Stacor Equipment Co., features drafting room furniture, drawing, tracing and X-ray equipment, and several new products. Illustrates, describes and gives specifications for Stakmasters 4- and 5-drawer files, Multimaster tables, Planmaster sectional steel filing cabinets, Draftmaster drafting tables and accessories, Thriftmaster drafting tables, Tracemaster tracing tables, taborets and X-ray film filing cabinets. Catalog is available from Stacor Equipment Company, 768-778 East New York Ave., Brooklyn 3, N. Y.

Advertisers' Index

Acme Fire Alarm Co., Inc. 8
Adache & Case, Engineers 36
Albright & Friel, Inc. 36
Alva F. Allen 8
Ark Engineering Company 36
Michael Baker, Jr., Inc. 36
Elmer S. Barrett Associates 36
E. D. Barstow & Associates 36
Paul Berg 34
Bettenburg, Townsend & Stolte 34
Black & Veatch 34
Norman Boosey Manufacturing Company 4
George W. Brandt, Engineer 36
Roger Barrett Bross 34
Brown & Blauvelt 35
Builders Estimating Service 37
C. L. Calkins 34
Capitol Engineering Corporation 36
Commonwealth Associates, Inc. 34
Consoer, Townsend and Associates .. 34
Crescent Engineering Company, Inc. .. 34
Geo. E. Deatherage & Son 38
DeLeuw, Cather & Company 34
Thomas E. Duce Associates 37
Eastern Heat Treating & Brazing Corp. 37
Ehrco Die Casting Service 37
Engineers Testing Laboratory, Inc. ... 37
Eustis Engineering Company 34
Fairchild Engine and Airplane Corp. . 7
Fay, Spofford & Thorndike 34
Orrin E. Fenn 34
Ferguson-Gates Engineering Company . 37
Forrest and Cotton 37
Foster & Cafarelli 35
Frazier-Simplex, Inc. 36
Freese & Nichols 37
Gannett, Fleming, Corddry & Carpenter, Inc. 36
General Electric Co. ..... Back Cover
Gustave M. Goldsmith 36
Green Engineering Co. 36
Greer & McClelland 35
Hall Laboratories, Inc. 36
Alexander Hamilton Institute 5
Hardesty & Hanover 35
Frank E. Harley & Associates 35
Frederic R. Harris, Inc. 35
The Hinchman Corporation 34
Howard, Needles, Tammen & Bergendoff 35
Johnston Brothers, Inc. 8
Kaiser Engineers 34
Kennedy-Riegger Drilling Co., Inc. .. 37
Kirk & Cowin 34
Knappen-Tippetts-Abbett-McCarthy .. 35
Kuljian Corporation 36
Law-Barrow-Agee Laboratories, Inc. .. 34
Lawrie & Green & Associates 36
Lockwood & Andrews 37
Louis J. Lucas 34
Madigan-Hyland 35
Mann-Mine Research & Development Co. 37
Emmet J. McDonald 36
Metcalf & Eddy 34
Merritt & Welker 34
Modjeski and Masters 37
George V. R. Mulligan, P.E. 34
H. C. Nutting Co. 36
James P. O'Donnell 35
Oklahoma Testing Laboratories 36
Ozalid Division, General Aniline & Film Corp. 11
Palmer & Baker, Inc. 34
Parsons, Brinckerhoff, Hall & MacDonald 36
Revolator Company 4
Cyrus Wm. Rice & Co., Inc. 37
Robert and Company Associates 34
Seelye, Stevenson, Value & Knecht .. 36
Singstad & Baillie 36
South Florida Test Service 34
D. B. Steinman 36
Syska & Hennessey, Inc. 36
Leonard M. Todd 36
Toledo Testing Laboratory 36
Harry L. Tooker & Associates 37
United States Testing Company, Inc. .. 35
Emerson Venable 37
Warren-Knight Co. 6
Water-Tight Underground Conduit ... 37
Wilton Smith Whipp 37
Whitman, Requardt and Associates .. 34
A. W. Williams Inspection Co. 34
Wilson & Company 34
The Wright Engineers 37

What's New

AMERICAN ENGINEER June, 1955
1121 FIFTEENTH ST., N.W., WASHINGTON 5, D. C.

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Company .....

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"SCOTCHRAP" PIPE INSULATION — *Item 1*

An all weather, polyvinyl chloride pipe wrap tape featuring increased adhesion and conformability even at freezing temperatures has been announced by Minnesota Mining and Manufacturing Co. It is a new, improved version of the firm's "Scotchrap" pipe insulation and is stated to be the first pressure-sensitive, polyvinyl chloride tape formulated exclusively for pipeline corrosion prevention. Under development for more than two years, experience has shown that the new tape can satisfactorily be applied in temperatures as low as zero degrees F., according to the manufacturer.

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HEATING-AIR CONDITIONING THERMOSTAT — *Item 2*

To meet demands for a single, super-sensitive heavy duty wall thermostat that will control both heating and air conditioning equipment, Fulton Sylphon Div. of Robertshaw-Fulton Controls Co. has developed the combination thermostat No. 801-A3. Has a differential of plus-or-minus ½° F. Employable with all types of heating plants and air conditioning units. Requires only connection with a manually operated summer-winter switch to provide the change from heating to cooling, and vice versa. Approved by UL. Has a high switch rating of 20 amp. non-inclusive at 250 volts AC; ¾ horsepower motor load at 115 volts AC; and 1½ horsepower motor load at 230 volts AC.

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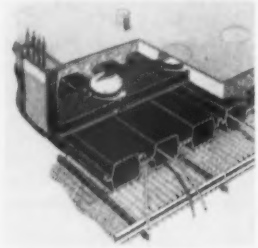
CELLULAR FLOORS, ELECTRICAL OUTLETS — *Item 3*



A new product for building construction—cellular steel sub-flooring developed jointly by General Electric and American Steel Band Co. permits unlimited electrical outlet flexibility and greater construction speed. American Cellular Flooring is delivered in easy-to-handle sections for quick erection. Wood forms, scaffolding or temporary shoring are eliminated. Permits wiring of all types to be run throughout the floor. Electrical outlets can be placed at any location, now or in future, giving complete freedom of floor planning.

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SYNTHETIC CUTTING COMPOUND — *Item 4*

A new product has been perfected which, when dissolved in water, yields a safe and economical cutting solution for use in all types of machine tools. Called Dromus Oil E, this Shell Oil Company product, made entirely of synthetic ingredients, has exceptional cooling properties. Actually dissolves in water, forming a true solution instead of an emulsion. The solution is stable at all temperatures normally encountered. May be mixed with a large volume of water for high cooling effect. Prevents rusting of parts. Improves wetting characteristics. Reduces friction.

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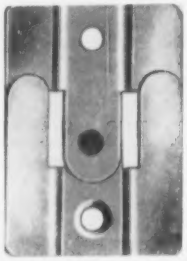
SPACE SAVING HANGER — *Item 5*



A device for attaching objects within ⅛" of any surface now being mass produced by Harvest House Manufacturing Co. Known as "Flushmount," the ingenious hanger is a two-piece interlocking unit that permits the invisible securing of objects with simplicity, ease of alignment, space-saving and weight reduction. Hanging of only ⅛" from surfaces is possible as each unit—one attached to the surface and one to the supported object—is only 1/16" thick. Cadmium plated.

This column describes new products of general interest to professional engineers. For further information, fill in the coupon provided and mail to the AMERICAN ENGINEER.

PAVING VIBRATOR — *Item 6*

For vibrating low slump concrete to full depth on airport and highway paving, a new adjustable Gar-Bro Paving Vibrator is being marketed by Gar-Bro Manufacturing Co. Can also be used for vibrating the concrete close to side forms. Individual vibrators, mounted on tubular frame, are adjustable for depth and spacing. Complete unit may be attached to concrete spreader or pulled on a special trailer behind the vibrator units. Three-inch vibrating heads, operating at 10,000 rpm, produce maximum compaction down to sub-grade.

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ZONE CONTROL AIR CONDITIONER — *Item 7*

In its engineering design, the Rheem Year 'Rounder central air conditioner has introduced advanced features into the combining of heating, filtering and cooling into a single central unit for residential use. With patented automatic zone control, it is said to offer a new level of economy, both in original cost and in operation. Automatic operation of zone control feature is governed by central controls, variable according to wishes. Cooling effectiveness can be directed to the part of residence being occupied. Diverts as much as 80 per cent of cooling into bedrooms at night and into living and dining areas during day.

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MAGNIFIER OVERCOMES DISTORTION — *Item 8*

"Precision-Vision 5-Power Magnifier," is announced by S. B. Logan & Co. Has unique built-in double lens. Highly corrected for spherical aberration. Withstands rough usage. Has all aluminum frame, 2" diam, ¾" thick in a black crinkle finish to eliminate reflections; and two individual optical-ground, polished, 1⅞" lenses, press-locked into ingenious mountings. Dustproof and break-resistant. The two lenses are separated by an air space, precision set to bring about powerful magnification.

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CONCERETE-RUBBER MIX FOR FLOORS — *Item 9*

Naugatuck Chemical division, United States Rubber Co., has developed a new concrete-type industrial flooring and construction material that "gives" without cracking under heavy loads, dampens shock and noise, resists alkalies and mild acids, is waterproof and has a non-slip quality. A combination of liquid rubber and a special cement powder, called Laticrete. Rubber content makes it flexible, also gives a tight bond to resist breakdown. A surface coating, it can be used for repair work or in new installations. Has good adhesion to concrete, metal and even glass. A quarter-inch layer will support heavy loads when laid over a hard base.

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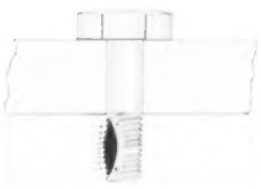
SELF-LOCKING TURNBUCKLES — *Item 10*

Self-Locking male threads in the form of self-locking air-craft turnbuckles and special bolts and screws are now being manufactured by Starloc, Inc. Eliminates the need for safety wiring, cotter pins, lockwashers, lock nuts, jam fits, staked bolts, etc. Locking action is achieved by a convex fibre insert in the thread of the bolt so formed as to permit easy insertion, and insure locking action along the entire length of insert against the nut or female thread. Convex insert permits unusually wide range of locking engagement.



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A. J. Nerad joined the Chemistry Department at the General Electric Research Laboratory in 1924 and has been manager of the *Mechanical Investigations Section* since 1948. His fields of interest are fluid mechanics, heat transfer, liquid metals, combustion, and superpressures. Last February it was announced that his group had produced man-made diamonds.

Jets and diamonds

Research by A. J. Nerad, versatile General Electric scientist, has led to widely diversified results

Tony Nerad is a name well known to those who design jet aircraft. Even before the U.S. had entered World War II, he had started on research that led to the development of a new kind of jet combustor. The combustor—simple, compact, and reliable over wide variations in combustion conditions—helped make possible one of the earliest American-designed turbojets. The contributions made by Nerad were battle-tested in Korea, and are important factors in maintaining the high prestige of U.S. jets today.

Recently Nerad helped to make dramatic news again. The General Electric Research Laboratory announced that he had led the team of scientists which produced man-made diamonds. Thirty years of research experience – work on jet combustors, liquid metals, and other projects—enable Tony Nerad to extend this promising area of *superpressure* research. This G-E research in high temperatures and high pressures demonstrates again that expanding our research program – and creating promising opportunities for scientists—contributes to progress.

Progress Is Our Most Important Product

GENERAL ELECTRIC